



36910680R



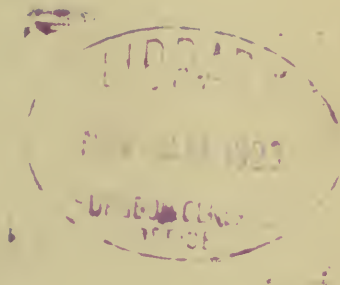
NLM 05181361 6

NATIONAL LIBRARY OF MEDICINE









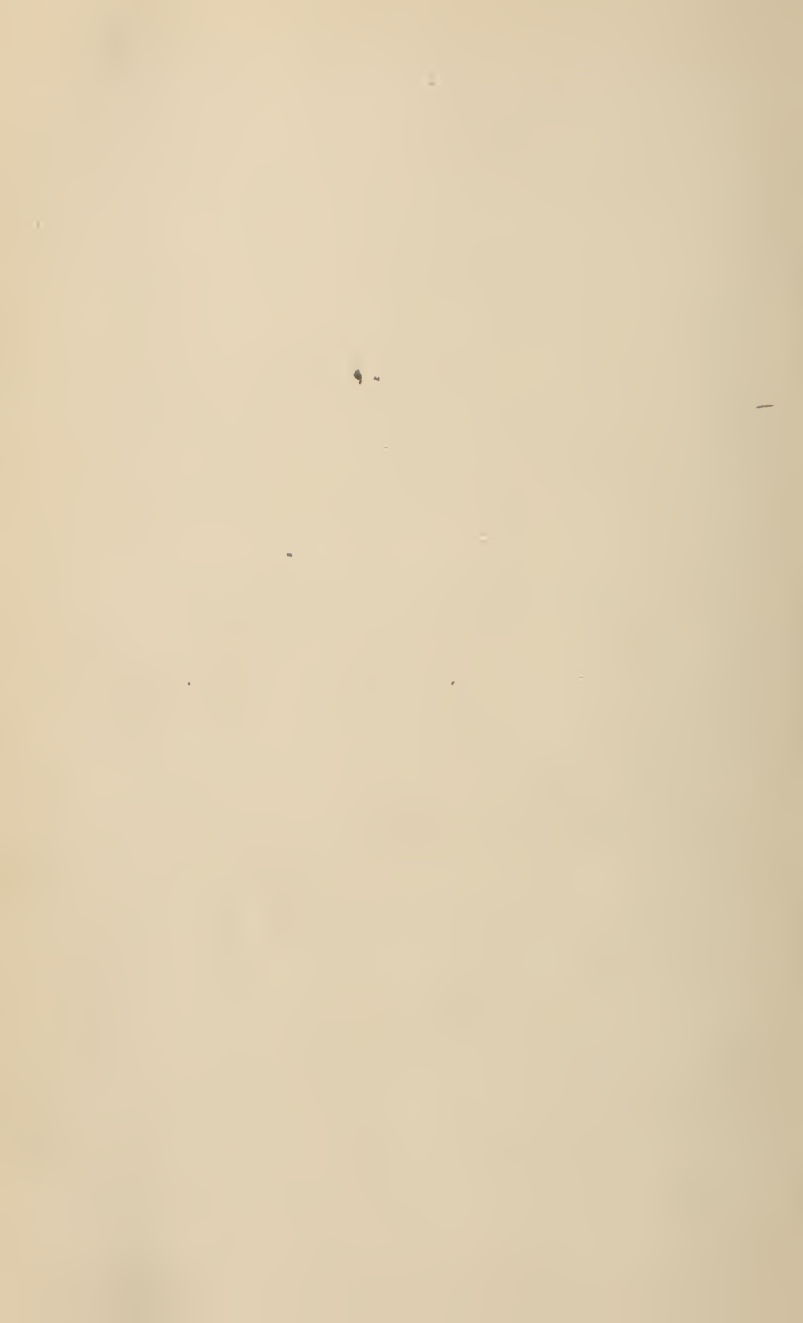








# CHIROPODY QUIZ COMPEND



# CHIROPODY QUIZ COMPEND

*Published Under the Auspices  
of the*

EDUCATIONAL COMMITTEE

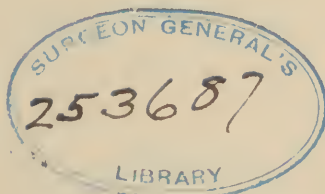
NATIONAL ASSOCIATION OF CHIROPODISTS, INC.

*Arranged and Edited by*

REUBEN H. GROSS, M. C.P.

FIRST EDITION

—1923—



PRICE FOUR DOLLARS



WE

B30

N277c

1923

COPYRIGHT 1923 BY  
THE NATIONAL ASSOCIATION OF CHIROPODISTS

Film NO. 6775, no. 6

AUG 30 '23

© Cl A 752701

# FOREWORD

---

With the publication of this volume the National Association of Chiropractors hopes to bring to those of its members who have not had the privileges and benefits of modern professional schooling, a stepping stone to educational advancement.

The Association does not claim nor does it presume that a volume of this kind can be complete, but it is presented with the hope that it may serve as an outline to those who wish to improve their knowledge and encourage them to deeper study along scientific lines.

With this in mind, the officers dedicate this volume to those pioneers in the profession, dead and living, whose vision, energy, and enthusiasm have made possible chiropractic's unprecedented advance.

Acknowledgment is made to those members whose generosity has made possible the publication of this compend, the monies for which were raised entirely by voluntary subscription.



# INDEX



ANATOMY . . . . .	11
HISTOLOGY . . . . .	26
PHYSIOLOGY . . . . .	38
BACTERIOLOGY . . . . .	57
PATHOLOGY . . . . .	67
PHYSICAL DIAGNOSIS . . . . .	74
DERMATOLOGY AND SYPHILOLOGY . . . . .	82
SURGERY . . . . .	96
PRACTICAL CHIROPODY . . . . .	122





## CHAPTER I.

# ANATOMY

1. *What is anatomy?* Anatomy is the science that deals with the study of the structure of organized bodies.
2. *What is human anatomy?* Human anatomy is the study of the structure of the human body.
3. *Mention the divisions into which the study of anatomy is divided.* The study of anatomy is divided into osteology, syndesmology, myology, angiology, neurology, the organs of special sense and the study of the viscera.
4. *What is osteology?* Osteology is the study of the bones of the body.
5. *What is syndesmology?* Syndesmology is the study of the ligaments and joints of the body.
6. *What is myology?* Myology is the study of the muscles of the body.
7. *What is angiology?* Angiology is the study of the blood vessels and lymphatics of the body.
8. *What is neurology?* Neurology is the study of the nerves of the body.
9. *What are the organs of special sense?* The organs of special sense are the eyes, the ears, the nose, the tongue, and the skin.
10. *What are the viscera?* The viscera (singular, viscus) are the internal organs of the body and are found in the abdomen and thorax, and include the heart, lungs, liver, stomach, kidneys, etc.
11. *What are the other divisions of the study of anatomy?* The divisions of the study of anatomy are applied anatomy, comparative anatomy, gross anatomy, minute anatomy, practical anatomy, and surgical anatomy.
12. *What is applied anatomy?* Applied anatomy is the application of anatomy in the diagnosis of disease and in treatment, especially surgical treatment.
13. *What is comparative anatomy?* Comparative anatomy is the study of the structure of the human body compared with the lower animals.

14. *What is gross anatomy?* Gross anatomy is the study of the body without the use of the microscope.
15. *What is minute anatomy?* Minute anatomy is the study of the intimate structures of the body invisible to the naked eye and requiring the use of the microscope; histology.
16. *What is practical anatomy?* Practical anatomy is the study of the structures of the body by means of actual dissection.
17. *What is surgical anatomy?* Surgical anatomy is applied anatomy in reference to surgical diagnosis and treatment.
18. *Why is a knowledge of anatomy essential to the chiropodist or podiatrist?* To successfully and intelligently treat the foot it is necessary to know intimately the structures with which one is dealing. It is impossible to make correct diagnoses unless the structure is thoroughly understood. It is impossible to tell a deviation from normal, unless the normal parts are known.

## Osteology of the Foot

19. *How many bones are in the foot?* There are twenty-six bones in the foot.
20. *How are they divided or classified?* They are divided into three groups: the tarsus, the metatarsus, and the phalanges.
21. *How many bones are in the tarsus?* There are seven (7) bones in the tarsus.
22. *How many bones are in the metatarsus?* There are five (5) bones in the metatarsus.
23. *How many phalanges are there?* There are fourteen (14) phalanges.
24. *Name the bones of the tarsus?* The os calcis, the astragalus, the cuboid, the scaphoid, the internal cuneiform, the middle cuneiform, and the external cuneiform.
25. *Name the bones of the metatarsus?* There are five bones, one for each toe and numbered from one to five, from within outward.
26. *Name the phalanges.* There are fourteen bones, three for each of the four lesser toes and two for the great toe.
27. *Describe the os calcis.* The os calcis is the largest of the tarsal bones and forms the heel. It articulates with the astragalus above and the cuboid in front. On its inner side it has a prominence called the sustentaculum tali, to which is attached the inferior calcaneo-navicular ligament or spring ligament. It is also called the calcaneus or heel bone.
28. *Describe the astragalus.* The astragalus is found above the os calcis and forms the ankle. It articulates with the os calcis below and the scaphoid in front. It also articulates with the two bones

of the leg, the tibia on the inner side and the fibula on the outer side. It fits into a mortice formed by these latter bones, all of which is called the ankle joint.

29. *Describe the cuboid.* The cuboid is found on the outer side of the foot in front of the os calcis and behind the base of the fifth metatarsal bone. It articulates with the os calcis behind, with the external cuneiform on the inner side and with the fourth and fifth metatarsal bones in front. It is found on the outer side of the scaphoid but does not articulate with that bone.
30. *Describe the scaphoid.* The scaphoid or navicular bone, is a boat-shaped bone found on the inner side of the foot in front of the astragalus. It has a prominence which can be easily felt on the inner side of the foot about one inch in front of the inner malleolus. It articulates with the astragalus behind and with the three cuneiform bones in front.
31. *Describe the cuneiform bones.* These bones are found in front of the scaphoid and are sometimes called wedge bones. The internal cuneiform is the largest and articulates with the scaphoid, the middle cuneiform, and the first and second metatarsals. The middle cuneiform articulates with the internal and external cuneiforms, with the scaphoid and with the second metatarsal. The external cuneiform articulates with the scaphoid, the middle cuneiform, the cuboid, and with the second, third, and fourth metatarsal bones.
32. *Describe the metatarsal bones.* The metatarsal bones are five in number. They articulate with the tarsal bones behind and with the bases of the proximal phalanges in front. They are long bones, having a shaft and two extremities. The first metatarsal is the thickest and below its head are found two sesamoid bones. The heads of the metatarsal bones form the metatarsal or anterior arch.
33. *Describe the phalanges.* The phalanges are fourteen in number, two in the great toe and three in each of the four lesser toes. Those that articulate with the heads of the metatarsals are called the proximal phalanges and those that are found at the ends of the toes are called the distal phalanges. These are flattened for the reception of the nails. The phalanges found between the distal and the proximal ones are called the middle phalanges. The phalanges, like the metatarsals, are long bones, having a shaft and two extremities.

## Syndesmology

34. *What is an articulation or joint?* An articulation or joint is a connection between two bones of the skeleton.
35. *What enters into the formation of joints?* Joints are made up of bone, cartilage, fibro-cartilage, ligaments, and synovial membrane.

36. *What is cartilage?* Cartilage is a non-vascular structure of the connective tissue variety.
37. *How many kinds of cartilage are there?* Three: hyaline cartilage, white fibro-cartilage, and yellow or elastic fibro-cartilage.
38. *What are ligaments?* Ligaments are bands of dense white fibrous tissue which bind bones together in joints.
39. *What are synovial membranes?* Synovial membranes are smooth membraneous structures which are found in joints and which secrete the synovia, a viscid, glairy fluid.
40. *Into how many classes are articulations divided?* Three classes: synarthrosis, amphiarthrosis, and diarthrosis.
41. *What is synarthrosis?* Synarthrosis is an immovable joint such as the sutures of the skull.
42. *What is amphiarthrosis?* Amphiarthrosis is a mixed articulation having limited motion as in the joints of the spinal column.
43. *What is diarthrosis?* Diarthrosis is a freely movable joint and is subdivided into (1) Ginglymus or hinge joint, example the elbow and ankle joints; (2) Condylod, where an ovoid head fits into an elliptical cavity, example the wrist joint; (3) Enarthrosis, ball and socket joint, the hip and shoulder joints and the astragalo-scapoid joint; (4) Arthrodial, gliding joint, the tarsal joints.
44. *What are the varieties of motion in joints?* The varieties of motion are four in number, viz., gliding, angular movement (including adduction, abduction, flexion, and extension), circumduction and rotation. These movements are often combined in the various joints.
45. *Describe the ankle joint.* The ankle joint is a ginglymus or hinge joint formed by the lower portions of the tibia and fibula with the astragalus. It has four ligaments, anterior, posterior, internal lateral, and external lateral. The internal lateral is called the deltoid and is involved in flat and weak foot.
46. *Describe the ligaments that connect the tarsal articulations.* The tarsal articulations are connected by the following ligaments, viz., the—  
 Os Calcis and astragalus by three ligaments, external, internal, and posterior.  
 Os Calcis and cuboid by four ligaments, superior, internal, long and short.  
 Os Calcis and scaphoid by two ligaments, superior and inferior.  
 Astragalus and scaphoid, one, superior.
47. *What are the dorsal and plantar ligaments of the tarsus?* The dorsal and plantar ligaments of the tarsus connect the scaphoid with the three cuneiform and with the cuboid, the three cuneiforms with each other and the external cuneiform with the cuboid.

48. *What are the interosseus ligaments of the tarsus?* The interosseus ligaments connect the os calcis with the astragalus, the scaphoid with the cuboid, the cuneiform bones with each other, and the external cuneiform with the cuboid.
49. *What is the nerve supply to the joints of the tarsus?* The anterior tibial nerve supplies all of the joints of the tarsus.
50. *Describe the tarso-metatarsal articulations.* The tarso-metatarsal articulations are five arthrodial joints formed by the bases of the metatarsal bones with the adjacent bones of the tarsus. The joints are bound by dorsal, plantar, and three interosseus ligaments.
51. *How many synovial membranes are there in the tarsus and metatarsus?* There are six synovial membranes in the tarsus and metatarsus.
52. *Where is the first synovial membrane situated?* It is found between the os calcis and the astragalus, behind the interosseous membrane.
53. *Where is the second synovial membrane found?* It is found between the os calcis and the astragalus, in front of the interosseous membrane.
54. *Where is the third synovial membrane situated?* It is found between the os calcis and the cuboid.
55. *Where is the fourth synovial membrane found?* This is the largest and most important of the six membranes. It is found between the scaphoid and the three cuneiform bones, running backward between the scaphoid and the cuboid, forward between the cuneiform bones, between the external cuneiform and the cuboid, between the middle and external cuneiform and the bases of the second and third metatarsal, passing also between the bases of these bones and the fourth metatarsal.
56. *Where is the fifth synovial membrane found?* It is found between the internal cuneiform and the base of the first metatarsal bone.
57. *Where is the sixth synovial membrane found?* It is found between the cuboid and the fourth and fifth metatarsal bones, also running forward between their bases.
58. *How are the metatarsal bones bound together?* The metatarsal bones, except the first, are bound at their bases by dorsal, plantar, and interosseous ligaments. The base of the first metatarsal bone is not connected with the base of the second by any ligaments, thus resembling the thumb in this respect.
59. *Describe the articulations of the phalanges with the metatarsal bones and the phalanges with each other.* These articulations are similar to those of the hand, each joint having a plantar and two lateral ligaments. There are no ligaments on the dorsum of these joints, the extensor tendons taking their places.

## The Muscles and Fasciae

60. *What are muscles?* Muscles are the active organs of locomotion, formed of bundles of reddish fibres endowed with the power of shortening themselves upon irritation.
61. *What is this power called?* The power that the muscles have to become shorter is called "Muscular Contractility."
62. *Into how many classes are muscles divided?* Two: voluntary, striped or skeletal muscle, and involuntary or unstriped muscle.
63. *What is the difference between the two classes of muscle, other than in structure?* The voluntary muscles are under the control of the will, while the involuntary muscles are not under the control of the will.
64. *How are muscles attached to bones?* Muscles are attached to bones by tendons and by aponeuroses.
65. *What are tendons?* Tendons are white glistening cords made up of white fibrous tissue. They connect the muscles to the structures upon which they act.
66. *What are aponeuroses?* Aponeuroses are fibrous membranes which join the muscle to the bone. They are structurally the same as a tendon except that they are flattened out. They appear in connection with flat muscles.
67. *What are fasciae?* Fasciae are flat structures which invest and bind the soft structures and muscles.
68. *How many kinds of fasciae are there?* There are two such structures: the superficial fascia and the deep fascia.
69. *Describe the superficial fascia.* The superficial fascia is made up of fibrous and areolar tissue and is found beneath the skin. It is almost continuous throughout the entire body.
70. *Describe the deep fascia.* The deep fascia is made up of fibrous, dense, inelastic tissue and ensheaths the muscles. It offers attachment to muscles and also encloses the vessels and nerves. It binds down these structures into a shapely mass.
71. *How do tendons terminate?* The tendons are attached to the periosteum of the bone, blending with the outer layer of that structure.
72. *How many muscles are there in the leg?* There are thirteen muscles in the leg, twelve of which are inserted in the foot.
73. *How are these muscles divided?* They are divided into four groups: (1) the anterior group, (2) the superficial posterior group, (3) the deep posterior group, (4) the external group.
74. *Name the muscles in the anterior group.* The tibialis anticus, the extensor longus hallucis, the extensor longus digitorum, and the peroneus tertius.



75. *Name the muscles in the superficial posterior group.* These muscles are called the calf muscles and are the gastrocnemeus, the soleus, and the plantaris.
76. *Name the muscles in the deep posterior group.* The popliteus, the flexor longus hallucis, the flexor longus digitorum, and the tibialis posticus.
77. *Name the muscles in the external group.* The peroneus longus and the peroneus brevis.
78. *Describe the tibialis anticus.* Origin, from the outer tuberosity and upper two-thirds of the shaft of the tibia externally; insertion, the inner and under surface of the internal cuneiform bone and the first metatarsal bone. Action, to flex the foot on the leg and to raise the inner border. Nerve, anterior tibial.
79. *Describe the extensor longus hallucis.* Origin, from the middle two-fourths of the fibula anteriorly; insertion, into the base of the last phalanx of the great toe; action, to extend the great toe; nerve, anterior tibial.
80. *Describe the extensor longus digitorum.* Origin, from the outer tuberosity of the tibia and the upper three-fourths of the shaft of the fibula anteriorly; insertion, into the second and third phalanges of the four lesser toes by four tendons; action, to extend the lesser toes; nerve, anterior tibial.
81. *Describe the peroneus tertius.* Origin, from the outer lower fourth of the fibula; insertion, into the base of the fifth metatarsal bone; action, to flex the tarsus; nerve, anterior tibial.
82. *Describe the gastrocnemeus.* Origin, by two heads from the condyles of the femur; joins the tendon of the soleus to form the tendo Achillis; insertion, the posterior tuberosity of the os calcis; action, to extend the foot; nerve, internal popliteal.
83. *Describe the soleus.* Origin, from the head and upper third of the shaft of the fibula posteriorly and from the oblique line of the tibia; insertion, as the tendo Achillis with the gastrocnemeus into the posterior tuberosity of the os calcis; action, to extend the foot; nerves, internal popliteal and posterior tibial.
84. *Describe the plantaris.* Origin, from the outer division of the linea aspera of the femur; insertion, by a long delicate tendon into the posterior surface of the os calcis; action, to extend the foot; nerve, internal popliteal.
85. *Describe the popliteus.* Origin, from the outer condyle of the femur; insertion, into the posterior portion of the tibia, above the oblique line; action, to flex the leg; nerve, internal popliteal. This is the one muscle in the leg that does not terminate in the foot.
86. *Describe the flexor longus hallucis.* Origin, from the lower two-thirds of the shaft of the fibula internally; insertion, into the base

of the last phalanx of the great toe; action, to flex the great toe; nerve, posterior tibial.

87. *Describe the flexor longus digitorum.* Origin, from the shaft of the tibia posteriorly, below the oblique line; insertion, into the bases of the last phalanges of the four lesser toes by four tendons which perforate the tendons of the flexor brevis digitorum; action, to flex the lesser toes and extend the foot; nerve, posterior tibial.
88. *Describe the tibialis posticus.* Origin, by two processes, between which pass the anterior tibial vessels (see Angiology) from the upper half of the shaft of the tibia posteriorly and the upper two-thirds of the shaft of the fibula internally; insertion, into the tuberosity of the scaphoid and internal cuneiform bones; action, to extend the tarsus and invert the foot; nerve, posterior tibial.
89. *Describe the peroneus longus.* Origin, from the head and upper two-thirds of the shaft of the fibula externally; insertion, into the outer side of the base of the first metatarsal bone and the internal cuneiform bone, having crossed the sole of the foot from the outer side in an oblique line; action, to extend and evert the foot; nerve, musculo-cutaneous.
90. *Describe the peroneus brevis.* Origin, from the lower two-thirds of the shaft of the fibula externally; insertion, into the dorsum of the base of the fifth metatarsal bone; action, to extend the foot; nerve, musculo-cutaneous.
91. *Mention the fasciae of the foot.* The anterior annular ligament, the internal annular ligament, the external annular ligament, the plantar fascia, and the dorsal fascia.
92. *Describe the anterior annular ligament.* This structure is found in front of the ankle joint and is a continuation of the superficial fascia. It is attached to the lower ends of the fibula and tibia, the os calcis and the plantar fascia. It contains sheaths or grooves which are lined with synovial membrane through which pass the extensor tendons.
93. *Describe the internal annular ligament.* This structure passes from the internal malleolus to the os calcis forming canals lined with synovial membrane for the passage of the flexor tendons and the posterior tibial vessels and nerve.
94. *Describe the external annular ligament.* This structure passes from the outer malleolus to the os calcis binding the peronei tendons in one synovial sac.
95. *Describe the plantar fascia.* The plantar fascia is the densest fascia in the body. It is divided into a central and two lateral portions. It is attached to the inner tuberosity of the os calcis, passes forward on the sole of the foot and divides into five processes, one for each of the toes. The lateral portions blend with the dorsal fascia.



96. *Describe the dorsal fascia.* The dorsal fascia is a thin membranous structure which is a continuation of the annular ligament. It passes forward and becomes gradually lost at the heads of the metatarsals, and blending with the plantar fascia laterally. It forms a sheath for the tendons on the dorsum.

## Muscles of the Foot

97. *How many muscles are there in the foot?* There are twenty muscles in the foot, one on the dorsum and nineteen on the plantar surface.
98. *Name and describe the muscle on the dorsum of the foot.* The muscle on the dorsum of the foot is called the extensor brevis digitorum. Origin, from the outer side of the os calcis; insertion, by four tendons, one into the first phalanx of the great toe and the others into the outer sides of the long extensor tendons of the second, third, and fourth toes; action, to extend the toes; nerve, anterior tibial.
99. *How are the muscles on the plantar surface of the foot divided?* The muscles on the sole are divided into four layers.
100. *Mention the muscles in the first layer.* Abductor hallucis, flexor brevis digitorum, and abductor minimi digiti.
101. *Mention the muscles in the second layer.* Flexor accessorius and four lumbricales.
102. *Mention the muscles in the third layer.* Flexor brevis hallucis, adductor obliquus hallucis, flexor brevis minimi digiti, and adductor transversus hallucis.
103. *Mention the muscles in the fourth layer.* Four dorsal and three plantar interossei.
104. *Describe the abductor hallucis.* Origin, from the inner tubercle of the os calcis; insertion, into the inner side of the base of the first phalanx of the great toe; action, to abduct the great toe; nerve, internal plantar.
105. *Describe the flexor brevis digitorum.* Origin, from the inner tubercle of the os calcis; insertion, into the sides of the second phalanges of the lesser toes by four tendons which are perforated for the passage of the long flexor tendons; action, to flex the lesser toes; nerve, internal plantar.
106. *Describe the abductor minimi digiti.* Origin, from the tubercles and under surface of the os calcis; insertion, into the base of the first phalanx of the little toe, with the tendon of its short flexor; action, to abduct the little toe; nerve, external plantar.
107. *Describe the flexor accessorius.* Origin, by two heads from the os calcis; insertion, into the tendon of the flexor longus digitorum; action, accessory flexor of the toes; nerve, external plantar.

108. *Describe the lumbricales.* Origin, the four lumbricales arise from the long flexor tendons at the point where the tendon divides; insertion, into the dorsum of the first phalanx of the four lesser toes; action, accessory flexors of the toes; nerves, internal plantar to the innermost and the external plantar to the outer three.
109. *Describe the flexor brevis hallucis.* Origin, from the cuboid and external cuneiform bones; insertion, into both sides of the base of the first phalanx of the great toe by two portions in which are found the sesamoid bones; action, to flex the great toe; nerve, internal plantar.
110. *Describe the adductor obliquus hallucis.* Origin, from the tarsal ends of the three middle metatarsal bones; insertion, into the outer side of the base of the first phalanx of the great toe; action, to adduct the great toe; nerve, external plantar.
111. *Describe the flexor brevis minimi digiti.* Origin, from the base of the fifth metatarsal bone; insertion, into the base of the first phalanx of the little toe externally; action, to flex the little toe; nerve, external plantar.
112. *Describe the adductor transversus hallucis.* Also called the transversus pedis. Origin, from the plantar ligaments of the three outer metatarso-phalangeal joints; insertion, outer side of the first phalanx of the great toe, blending with the tendon of the adductor obliquus hallucis; action, to adduct the great toe; nerve, external plantar.
113. *Describe the dorsal interossei muscles.* There are four such muscles. Origin, each by two heads from the adjacent sides of the two metatarsal bones; insertion, into the base of the first phalanx of the corresponding toe, the second having two; action, to abduct the toes; nerve, external plantar.
114. *Describe the plantar interossei muscles.* There are three such muscles. Origin, from the shafts of the third, fourth, and fifth metatarsal bones; insertion, into the bases of the first phalanges of the same toes; action, to adduct the toes toward the median line; nerve, external plantar.

## Angiology

115. *Describe the arteries.* The arteries are cylindrical tubular vessels which carry blood from the heart to every part of the body.
116. *Describe the capillaries.* The capillaries are minute blood vessels which form a network throughout the tissues of the body and connect the terminating arteries with the commencing veins.
117. *Describe the veins.* The veins are the vessels which return the blood from the capillaries to the heart.
118. *How many divisions of veins are there?* Two, the superficial and the deep veins.

119. *Describe the lymphatics.* The lymphatics are delicate transparent vessels which are distributed throughout the body wherever there are blood vessels and they convey the lymph to the blood. The larger lymphatics are constructed much like the veins and act as an auxiliary venous system. The lymphatic system terminates by flowing into the venous system through the thoracic duct and the right lymphatic duct.
120. *Describe briefly how the arterial blood reaches the foot from the heart.* The blood leaves the heart and enters the arch aorta, then passes downward through the thoracic aorta, the abdominal aorta and enters the common iliac arteries. These divide into an internal and external iliac and this latter branch enters the thigh where it becomes the femoral artery. The femoral continues down the thigh to behind the knee joint where it is called the popliteal artery. The popliteal divides a little below the knee joint into the anterior tibial and the posterior tibial arteries. These latter pass downward into the foot.
121. *Describe the anterior tibial artery.* The anterior tibial artery is a branch of the popliteal artery. It passes between the two heads of the tibialis posticus, over the upper edge of the interosseus membrane and then down the front of the leg and at the ankle joint it becomes the dorsalis pedis.
122. *Describe the dorsalis pedis artery.* The dorsalis pedis artery is a continuation of the anterior tibial and extends from in front of the ankle joint to the back part of the first intermetatarsal space where it terminates in the dorsalis hallucis. It gives off branches as follows: tarsal, metatarsal, dorsalis hallucis, and communicating.
123. *Describe the tarsal branch of the dorsalis pedis artery.* The tarsal branch passes outward along the tarsus.
124. *Describe the metatarsal branch of the dorsalis pedis artery.* The metatarsal branch passes outward at the metatarsus and gives off three interosseus branches which pass forward in the three outer interosseus spaces. These three interosseus branches give off seven digital branches which supply the three and one-half outer toes.
125. *Describe the dorsalis hallucis artery.* This artery continues forward from the dorsalis pedis and supplies the great toe and the inner side of the second toe.
126. *Describe the communicating branch of the dorsalis pedis artery.* This branch dips down into the sole of the foot in the first interosseus space and joins the external plantar artery, thus completing the plantar arch. It then gives off a branch on the plantar surface which is called the dorsalis princeps hallucis or the arteria magna hallucis which supplies the great toe and the inner side of the second toe on the plantar surface. This is an exceptional situation, where a branch of a dorsal artery supplies the plantar surface.

127. *Describe the posterior tibial artery.* The posterior tibial artery is a branch of the popliteal artery and extends along the back of the tibia to the fossa below the inner malleolus where it divides into the internal and the external plantar arteries.
128. *Describe the internal plantar artery.* The internal plantar artery is the smaller of the terminal branches of the posterior tibial and passes along the inner side of the foot and the great toe.
129. *Describe the external plantar artery.* The external plantar artery is the larger of the two terminal branches of the posterior tibial artery. It sweeps across the plantar aspect of the foot in a curve, the convexity of which is directed forward and outward. It then turns inward at the bases of the metatarsal bones, and at the first interosseous space it inosculates with the communicating branch of the dorsalis pedis, completing the plantar arch, or the stirrup anastomosis. It gives off four digital branches which divide to supply the three outer toes and the outer side of the second toe.
130. *Describe the veins of the foot.* The veins of the foot are superficial and deep. On the plantar surface there are no superficial veins, these being found only on the dorsum. Deep veins are found both on the dorsal and plantar surfaces, and follow the course of the arteries, and are named after them.
131. *Describe the venous arch.* The venous arch is formed on the dorsum of the foot by the superficial venules from the toes which meet at about the heads of the metatarsal bones. From the inner side of the venous arch the internal or long saphenous vein commences and from the outer side, the external or short saphenous vein takes its origin.
132. *Describe the internal or long saphenous vein.* The internal or long saphenous vein commences on the inner side of the venous arch and runs up the leg and inner side of the thigh and enters into the femoral vein.
133. *Describe the external or short saphenous vein.* The external or short saphenous vein arises from the outer side of the venous arch, ascends behind the outer malleolus, up the middle of the back of the leg and empties into the popliteal vein. The popliteal vein in turn empties into the femoral.
134. *Describe the lymphatics of the lower extremity.* The lymphatics of the lower extremity are in two sets, the superficial and deep. The superficial lie in the superficial fascia along the course of the saphenous veins. The deep are few in number and accompany the deep blood vessels.

## Neurology

135. *How do the nerves reach the foot and leg?* The nerves of the foot and leg are branches of the great sciatic nerve which comes from the lumbo-sacral cord and the four upper sacral nerves. These structures come from the spinal cord.

136. *Describe the great sciatic nerve.* The great sciatic nerve is the largest nervous cord in the body. It passes through an opening called the great sacro-sciatic foramen to the back of the thigh, giving off branches and terminating in the internal and the external popliteal nerves.
137. *Describe the internal popliteal nerve.* The internal popliteal nerve is the larger of the two terminal branches of the great sciatic and descends along the back of the thigh and knee where it becomes the posterior tibial nerve. It gives off a branch called the communicans tibialis or communicating branch which joins the communicating branch of the external popliteal to form the external saphenous nerve.
138. *Describe the external popliteal nerve.* The external popliteal nerve is the smaller of the two terminal branches of the great sciatic nerve and descends obliquely along the outer side of the popliteal space and winds around the head of the fibula and about one inch below the head of the fibula it divides into the anterior tibial nerve and the musculo-cutaneous nerve. It gives off a branch called the communicans peronei or the communicating branch which joins the communicating branch of the internal popliteal to form the external saphenous nerve. This nerve is sometimes called the peroneal nerve.
139. *Describe the external saphenous nerve.* The external saphenous nerve is formed by the both communicating branches of the popliteals. It descends along the outer side of the leg to the outer malleolus and is distributed to the skin on the outer side of the foot and the little toe.
140. *Describe the posterior tibial nerve.* The posterior tibial nerve is a continuation of the internal popliteal nerve and descends along the back of the leg to the inner malleolus where it divides into the internal and the external plantar nerves.
141. *Describe the internal plantar nerve.* The internal plantar nerve is one of the terminal branches of the posterior tibial nerve and supplies the inner plantar muscles, the sole of the foot, and the skin of the three and one-half inner toes.
142. *Describe the external plantar nerve.* The external plantar nerve is one of the terminal branches of the posterior tibial nerve and supplies the outer plantar muscles and the skin of the one and one-half outer toes.
143. *Describe the anterior tibial nerve.* The anterior tibial nerve is one of the terminal branches of the external popliteal nerve and passes down the front of the leg in company with the anterior tibial vessels. It supplies the extensor muscles, the ankle joint and the skin of the adjacent side of the great and second toes.
144. *Describe the musculo-cutaneous nerve.* The musculo-cutaneous nerve is one of the terminal branches of the external popliteal nerve and passes down the front of the leg superficially. It di-



vides into two branches, the internal and the external branches. These in turn divided into two branches also called the internal and external branches.

145. *Describe the distribution of the musculo-cutaneous nerve.* The internal branch of the internal branch supplies the inner side of the great toe. The external branch of the internal branch supplies the adjacent sides of the second and third toes. The internal branch of the external branch supplies the adjacent sides of the third and fourth toes. The external branch of the external branch supplies the adjacent sides of the fourth and fifth toes.
146. *How many divisions of the nervous system are there?* There are two divisions: (1) the cerebro-spinal system which includes the brain and the spinal cord and the peripheral nerves; (2) the sympathetic system, which includes the great plexuses such as the cardiac and solar plexus and ganglia. The first deals more with sensation and motion and the second deals more with the function of the vessels, viscera, and glands.
147. *What are motor nerves?* Motor nerves are efferent nerves which convey impulses which excite muscular contraction.
148. *What are sensory nerves?* Sensory nerves are afferent nerves conveying stimuli from the outer world which are converted into sensations by the central nervous system.
149. *What is an efferent nerve?* An efferent nerve is one that conveys an impulse from the central nervous system to the periphery.
150. *What is an afferent nerve?* An afferent nerve is one that conveys an impulse from the periphery to the central nervous system.

## The Skin and its Appendages

151. *What are the divisions of the skin?* The skin is divided into two main divisions—the epidermis and the derma.
152. *Briefly describe the epidermis.* The epidermis, cuticle or scarf skin, is made up of epithelial tissue without blood supply and with nerves only in the deeper layers. It is made up of four layers from without inward: (1) stratum corneum, (2) stratum lucidum, (3) stratum granulosum, (4) stratum mucosum or rete malpighii.
153. *Briefly describe the derma.* The derma, true skin, corium or cutis vera, is made up of connective tissue, rich in blood and nerve supply and containing the hair follicles, sweat and sebaceous glands. It is composed of two layers, the upper or papillary and the lower or reticular layer.
154. *What are the appendages of the skin?* The appendages of the skin are nails, hairs, sweat glands, and sebaceous glands.
155. *Mention the structures found in the skin.* The papillae which con-

tain the tactile corpuscles, or touch organs, are found in the papillary layer of the derma. The hair follicles are in the reticular layer of the derma. The sebaceous glands are found in the reticular layer of the derma. The sweat glands are found in the subcutaneous tissue. The fat cells are found in the subcutaneous tissue.

156. *Briefly describe the nail.* The nail is a curved, flat, horny structure a modification of the epidermis, molded upon the derma at the distal ends of the fingers and toes on the dorsal surface of the distal phalanges. The nail is convex on its outward surface and is embedded by its root into the posterior nail fold.
157. *What is the nail matrix?* The nail matrix is that portion of the nail bed immediately beneath the body of the nail and is made up of highly vascular papillae. It is from this structure that the nail is produced.
158. *What is the lunula?* The lunula is a white crescentic portion of the nail nearest to its root, produced by the diminution of the number and size of the papillae beneath.
159. *Briefly describe the hairs.* The hairs are a modified form of epidermis, found over nearly the whole surface of the body, much varied in size and color. Each hair consists of a root and a shaft.
160. *What is the hair root?* The hair root is the lower end of the hair which is lodged in an involution of the epidermis called the hair follicle. The root rests on a vascular papilla which supplies it with the material from which it grows.
161. *What is the hair shaft?* The hair shaft is the projecting portion of the hair.
162. *Briefly describe the sweat glands.* The sweat or sudoriferous glands consist each of a single convoluted tube which is found in the subcutaneous tissue and opening on the surface of the skin by a spiral duct. The glands are very numerous varying in different parts of the body, the total being estimated at about two and one-half millions. They are most numerous on the palms and soles.
163. *Briefly describe the sebaceous glands.* The sebaceous glands are small bodies found in the corium almost all over the body, but not on the palms and soles. Each gland has a single duct which opens into a hair follicle or on the epidermis.

## CHAPTER II.

# HISTOLOGY

1. *What is histology?* Histology is the study of the structural elements of animal and plant organisms. The term is usually applied to animal tissues only.
2. *What is human histology?* Human histology is the study of the minute structures of the human body. It is also called minute anatomy or microscopic anatomy.
3. *What are the structural elements?* The structural elements are the cells and the intercellular substance.
4. *How is the character of the various organs and tissues determined?* The character of the various tissues and organs of the body is determined by the relation of the cells and the intercellular substance, by the relative quantity of each, by the size and character of the cells and by the consistency and character of the intercellular substance.
5. *What is a cell?* A cell is a minute structure, the living active basis of animal organization. It is composed of a mass of protoplasm containing a nucleus.
6. *Are all cells in the body alike?* No. The cells differ in size, shape, and function.
7. *What is a typical cell?* A typical cell is a cell that is taken theoretically for description and shows all of the component parts that may be considered as being present in nearly every cell at some time during its life.
8. *What are the component parts of a typical cell?* A typical cell is composed of a cell wall, of cytoplasm, of a nucleus, of nucleoli, of a paranucleus, and of a centrosome.
9. *What is the cell wall?* The cell wall is the outer investment of the cell and should be regarded as a condensation or specialization of the cytoplasm rather than as a distinct and separate structure. It usually appears under the microscope as a single delicate line.
10. *What is the cytoplasm?* The cytoplasm, or cell contents, is a semi-liquid substance, composed of an elastic portion called the spongeoplasm and within the network of the spongeoplasm is the hyaloplasm.



11. *What is the nucleus?* The nucleus is a very important part of the cell. It is found within the cytoplasm, usually in the center of the cell and is limited by a distinct wall called the nuclear membrane. It is composed of a network called chromatin filaments in which is held a semi-liquid substance called the achromatin substance.
12. *What are nucleolei?* The nucleolei are spherical bodies held in the network of the chromatin filaments. The significance of these bodies is not known.
13. *What is the paranucleus?* The paranucleus, or accessory nucleus, is an irregular spherical body, found within the cytoplasm and near the nucleus. Little is known of this structure.
14. *What is the centrosome?* The centrosome is a very small highly refracting body found within the nucleus of the cell. This portion of the cell plays an important part during the reproduction of the cell.
15. *What are vital manifestations?* The vital manifestations are those characteristics that distinguish a living cell from inorganic matter.
16. *How are the vital manifestations classified?* The vital manifestations are classified as metabolism, growth, irritability, motion, and reproduction.
17. *What is metabolism?* Metabolism is a term applied to that power which the cell has to select from surrounding food materials, such substances that will suit its needs for nutrition and function and making them part of the cell. It also includes the power of the cell to expel waste matter. It is divided into anabolism and catabolism.
18. *What is anabolism?* Anabolism is the term applied to the constructive or assimilative changes in a cell.
19. *What is catabolism?* Catabolism is the term applied to the destructive or retrogressive changes in a cell.
20. *What is growth?* Growth is the natural outcome of metabolism and is the unequal development of the cell. The growth of a cell may be equal in all parts, but usually it is unequal. This unequal growth exerts a great influence toward the specialization of form in the cells.
21. *What is irritability?* Irritability is the power of the cell to respond to external stimuli by changes within the cell itself.
22. *What is motion?* Motion is a manifestation of all cells sometime during their life history. This power is influenced by the development and specialization of some cells as they mature. In some cells external appendages develop, while in others the cytoplasm undergoes specialization, resulting in a peculiar tissue, such as voluntary muscle fibres.

23. *What is reproduction?* Reproduction is the most important of the vital manifestations and consists of the division of a cell into two cells, etc. This phenomenon occurs in two ways: (a) by direct cell division or akinesis, (b) by indirect cell division or karyokinesis.
24. *What is akinesis?* Akinesis or fission or direct cell division occurs in some cells. It consists of mere constriction and setting free of a portion of the cell without the complex changes that occur in the indirect method. It is the exception rather than the rule in the human body.
25. *What is karyokinesis?* Karyokinesis, or indirect cell division, is a complex procedure in which changes take place within the cell producing two daughter cells from one mother cell. The centrosome plays an important part in this form of cell reproduction. (The reader is referred to any standard textbook on histology for the details of this phenomenon.)
26. *What is the ovum?* The ovum is the parent cell from which all of the cells of the human body are derived.
27. *Describe the ovum.* The ovum is a specially developed cell of one of the female generative organs, the ovary. It is one of the largest histologic elements and undergoes certain peculiar changes preparatory to reproduction. Before the ovum can complete its life function, it must be joined by the male sexual element, the spermatozoon, which is derived from the testicle.
28. *Describe the changes that take place in the ovum before it reproduces.* The preparatory changes that take place in the ovum are called maturation. These changes are as follows: there is an unequal division of the ovum and a protrusion of minute portions of its cytoplasm. These protrusions are called polar bodies. After the formation of the polar bodies a nucleus appears which is called the female pronucleus. This completes maturation and the ovum is ready to receive the spermatozoon.
29. *Describe the process known as fertilization of the ovum.* Fertilization consists of the entrance of the spermatozoon into the ovum which results in the formation of a male pronucleus. Subsequently, the male pronucleus joins with the female pronucleus and after this fusion there is a period when there is no nucleus within the ovum. Shortly afterward a nucleus of segmentation appears. This completes fertilization.
30. *What occurs in the ovum after fertilization is completed?* After fertilization the ovum divides and redivides by indirect cell division and so a large number of cells form which arrange themselves into three layers called the blastodermic layers or the blastoderm.
31. *What is the blastoderm?* The blastoderm, or blastodermic layers, are three more or less distinct layers of cells which are named (a) ectoderm, (b) mesoderm, (c) entoderm.

32. *Describe the ectoderm.* The ectoderm is the outer layer of the blastoderm and from it are developed the following tissues of the body: the epithelium of the outer surface of the body including the appendages, the epithelium of the nasal tract, the epithelium of the mouth, the enamel of the teeth, the tissues of the nervous system, etc.
33. *Describe the mesoderm.* The mesoderm is the middle layer of the blastoderm and from it are derived the following tissues of the body: the connective tissues, the muscular tissues, the tissues of the vascular and lymphatic systems, the kidney and ureter, etc.
34. *Describe the entoderm.* The entoderm is the inner layer of the blastoderm and from it are derived the following tissues of the body: the epithelium of the digestive tract, the epithelium of the respiratory tract, the epithelium of the urinary bladder and urethra, etc.
35. *Describe the blastodermic development.* As the cells develop from the ovum and form the three layers called the blastoderm there is a gradual advancement in arrangement and then from these three layers all the tissues of the body are formed. The tissues are classified into five subdivisions called the elementary tissues.
36. *What are the elementary tissues of the body?* The five elementary tissues of the body are epithelial tissue, connective tissue, muscular tissue, nervous tissue, and blood and lymph.
37. *How are these tissues differentiated?* The differentiation between the elementary tissues depends upon the character of the cells, the amount and character of intercellular substance, together with the relationship between them in quantity.
38. *How is tissue prepared for histologic examination?* All tissue must undergo special preparation before it can be studied under the microscope. The preparation consists of first removing all of the water contained therein and then embedding it in some material usually paraffin or celloidin. This makes it possible to cut the tissue into thin sections so that it can be easily studied. The thin section is then mounted upon a glass slide and when fixed thereon, it is stained with dyes of different colors so that different parts of the cells and intercellular substance are easily distinguished.
39. *What is epithelial tissue?* Epithelial tissue is that tissue which is found covering all structures connected with the outer air such as the entire lining of the digestive tract, the epidermis, the respiratory tract, etc.
40. *How is epithelium classified?* Epithelium is classified according to the shape and appearance of the cell as follows: (1) Squamous—(a) simple, consisting of a single layer; (b) stratified, consisting of several layers. (2) Columnar—(a) simple, (b) stratified.

(3) Modified—(a) ciliated, (b) goblet, (c) pigmented. (4) Specialized—(a) glandular epithelium, (b) neuro-epithelium.

41. *Describe how epithelium is nourished.* Epithelium is without blood supply and receives its nourishment through the power of absorption from the structures upon which it rests. The nerve supply is very irregular, in some places being entirely absent and in other structures it is very highly developed, as in the cornea of the eye. The epithelial cells usually rest upon a basement membrane (membrana propria) which is a modification of the connective tissue.
42. *Describe simple squamous epithelium.* Simple squamous epithelium consists of a single layer of flat, polyhedral plates, with or without nuclei, so arranged that their edges are in close apposition and held together by a cement substance. This form of epithelium is found only in a few places in the human body as in the air sacs of the lungs.
43. *Describe stratified squamous epithelium.* This form of epithelium is more commonly found in the body. The cells vary greatly in size and shape depending upon in which layer they are found. Those of the deeper strata are not scaly but irregularly columnar in shape. The cells become more flattened in the upper layers and in the outermost layers the cells are scaly, non-nucleated plates. An example is the epidermis.
44. *Describe simple columnar epithelium.* This form of epithelium is more common than the simple squamous type. It is composed of a single layer of cells resting upon a basement membrane. It is found in the greater portion of the digestive tract and in other places.
45. *Describe stratified columnar epithelium.* Stratified columnar epithelium is composed of several layers of columnar cells. The lower strata of cells are more or less flattened out by the superimposed cells of the upper layers. The nuclei of the lower cells are found near the basement membrane, while those of the upper layers are found in the center of the cell.
46. *Describe ciliated epithelium.* Ciliated epithelium is composed of epithelial cells found on a free surface and showing hair-like processes which extend outward and are called cilia. These cilia, by the wave-like motion, serve to keep in action the flow of secretions that pass over the surface and prevent foreign bodies from entering structures to which they would be harmful. The cilia are specialized prolongations of the cytoplasm of the cell.
47. *Describe goblet-cell epithelium.* The goblet cell is a columnar cell which contains particles of mucous. In discharging this mucous the cell takes on a scooped-out appearance at the upper portion with the nucleus crowded down toward the base of the cell.
48. *Describe the pigmented epithelium.* The cytoplasm of some epithelial cells contains a granular substance called melanin which

gives the cell a brown or blackish tint. Such a cell is called a pigmented cell and is found in the epidermis of certain races such as the negro. These cells are also found in the outer layers of the retina.

49. *Describe glandular epithelium.* Glandular epithelium is a specialized form varying from columnar to polyhedral in shape. The cells are modified so that they are able to manufacture a secretion. The cytoplasm is more or less filled with the secretion and sometimes the cytoplasm is almost entirely displaced by fatty substances as in the sebaceous glands.
50. *Describe neuro-epithelium.* Neuro-epithelium is a specialized epithelium toward which the nerves of special sense are directed and receives these nerve endings.
51. *What is endothelial tissue?* Endothelial tissue, or endothelium, is a division closely resembling epithelium and is classified by some in that group. On the other hand, it is derived from the mesoderm and others classify it with the connective tissues. Endothelium is found lining all cavities not connected with the outer air, such as the pleural and peritoneal cavities, and lines all blood vessels. It occurs as a single layer of cells resting upon a sub-endothelial stroma. The cells are irregular in size and shape. The typical endotheliæ cells are large polyhedral plates with a round or oval nucleus found in the center of the cell.
52. *What is connective tissue?* Connective tissue forms the connective and supporting framework of the entire body. It is the most widely distributed of all the tissues. In connective tissue the intercellular substance is very abundant and in some instances, it predominates over the cells. This is especially true in tissues such as bone or cartilage.
53. *How is connective tissue classified?* The important subdivisions of connective tissue are: (a) areolar tissue, (b) white fibrous tissue, (c) yellow elastic tissue, (d) cartilage, (e) bone, (f) adipose tissue.
54. *Describe areolar tissue.* Areolar tissue is that form of connective tissue which is composed of flat stellate cells which are held in place by fine delicate fibers, that are prolongations of the cytoplasm of the cells. Areolar tissue is found in the supporting framework of the soft organs of the body and in fine layers between the muscles.
55. *Describe white fibrous tissue.* White fibrous tissue occurs in all parts of the body. The cells of this tissue are small and flattened and the fibers are found in bundles, either loose or compact, depending on the locality in which it is found. When found loose, the fibers have a wavy appearance, but when found compact as in a tendon, the wave is not noticed.
56. *Describe yellow elastic tissue.* Yellow elastic tissue is found in association with white fibrous tissue and sometimes is classified



with it. The elastic fibers differ from the white fibers, but otherwise the tissues are the same. The elastic fibers are found in bundles interwoven with white fibers and are much thicker and more tortuous than the white fibers.

57. *Describe cartilage.* Cartilage is a form of connective tissue which shows marked specialization of the intercellular substance depending upon the variety of cartilage.
58. *Mention the varieties of cartilage.* There are three varieties of cartilage: (a) hyaline, (b) fibrous, (c) elastic.
59. *Describe hyaline cartilage.* Hyaline cartilage is widely distributed, being found at the ends of bones. It appears blue in mass. The intercellular substance is called the "matrix" and is made up of bundles of white fibers. The cartilage cells occur in spaces within the matrix, these spaces being called "lacunae," each space containing two or more cells. The free surface of the cartilage is covered by a dense fibrous tissue called the "perichondrium."
60. *Describe fibrous cartilage.* Fibrous cartilage is found in only a few places in the body, but when found, it is in considerable bulk. The inter-vertebral disks are fibro-cartilage. It is made up of closely packed bundles of white fibers containing lacunae and cartilage cells. It has no distinct perichondrium.
61. *Describe elastic cartilage.* The distribution of elastic cartilage is limited. The cartilages of the external ear are elastic cartilage. It is dull yellow in color, pliable, and tough as compared to the bluish, comparatively brittle hyaline cartilage. It appears as a net work of wavy fibers in which are found lacunae and cartilage cells.
62. *Describe bone.* Bone is one of the dense forms of connective tissue. Its structure is similar to that of cartilage, differing in that within the matrix lime salts are deposited. There are two varieties of bone—(a) compact and (b) spongy.
63. *Describe a cross-section of compact bone.* A cross-section of compact bone shows a number of round or oval openings called the "Haversian Canals." Each such canal is surrounded by calcareous plates concentrically arranged and called "lamellae." Between the lamellae are small spaces called "lacunae" and the bone cells are found within these lacunae. Connecting the lacunae with each other and with the Haversian canals are small channels called "canaliculi." Collectively this is called an Haversian system.
64. *Describe spongy bone.* Spongy, or cancellated bone, is made up of delicate lamellae united into a bony framework, so arranged as to give strength without weight. The structure is very similar to compact bone. It is found at the end of long bones, while the shaft of such bones is made up of compact bone.
65. *What is the periosteum?* The periosteum is a fibrous covering found over bone except at the extremity where it blends with the

perichondrium. It is composed of two layers, an outer fibrous layer and an inner fibro-elastic layer. In early life there is a third layer present called the osteo-genetic layer.

66. *What is the marrow cavity?* The marrow, or medullary cavity, is found in the center of long bones and contains the marrow. In young, growing persons, the marrow is red and has a rich blood supply. Later in life, fat deposits form and the marrow takes on a yellow appearance.
67. *Describe muscular tissue.* Muscular tissue is made up of cells which have a highly developed power of contractility. The cells are especially constructed for this purpose, being elongated structures which shorten so as to exert a direct pull which results in a movement of the part upon which the action is exerted.
68. *How does muscular tissue occur in the human body?* Muscular tissue occurs as striated and non-striated when considered histologically and as voluntary and involuntary when considered physiologically. The heart muscle is a third variety, being striated but involuntary.
69. *Describe non-striated or involuntary muscle.* Non-striated muscle occurs in bundles and thin sheets, mostly in the walls of vessels and the hollow viscera. It is widely distributed, but seldom forms large masses. It is found in the digestive tract, the respiratory tract, the urinary tract, in the generative organs, and in the skin. The non-striated muscle units are called "fiber-cells." The cells are spindle shaped and have a rod-shaped nucleus which is found in the center of the cell. Within the cell are found contractile fibrillae.
70. *Describe striated or voluntary muscle.* This form of muscle tissue includes all the muscles attached to the skeleton. The structural unit is the striated muscle fiber, which is a highly specialized cell. The muscle fiber is an elongated cell which is multi-nucleated and consists of a sheath called the "sarcolemma" in which is found the "sarcous substance." The sarcolemma is a transparent elastic membrane which corresponds to the cell wall in other cells. The sarcous substance is made up of sarcoplasm and contractile fibrillae. These latter structures bring about contraction of the muscle fiber. The nuclei of a muscle fiber are found immediately beneath the sarcolemma.
71. *Describe the heart muscle.* The heart or cardiac muscle is a combination of, or may be classified between, the striated and the non-striated varieties. The muscle cell is a short cylindrical fiber which has lateral processes or branches. The apposition of these branches forms a close, narrow network. There is no sarcolemma and the nuclei are found near the center of the cell.
72. *How is nervous tissue divided?* Nervous tissue is divided for convenience of study into (a) nerve cells, (b) nerve fibers, (c) neuroglia.

73. *What are nerve cells?* The nerve cells are that portion of nervous tissue from which nervous impulses arise.
74. *What are nerve fibers?* Nerve fibers are structures which convey nerve impulses.
75. *What are neuroglia?* Neuroglia are the tissues which act as a framework in supporting the cells and fibers.
76. *Describe the nerve cells.* Nerve cells are of a great variety of shapes and some of them are very large. They consist of a mass of granular or striated cytoplasm in which is found a large round or oval nucleus. The cytoplasm of every nerve cell extends away from the main mass into at least one prolongation or process called the axone or axis cylinder. Usually there are two or more such processes and in these cases one is called the axone and the others the dendrites. According to the number of processes the nerve cells are classified as unipolar, bipolar, and multipolar. A nerve cell with its processes is called a neurone.
77. *Describe the nerve fibers.* The nerve fibers are not independent elements, but are prolongations of the processes of neurones. The fundamental part of the nerve fiber is the central portion called the "axis cylinder," which is a delicate thread surrounded by the "axilemma." Around the axis cylinder is a thick coat called the medullary sheath, or the white matter of Schwann, around which is found the neurilemma or sheath of Schwann.
78. *How are nerve fibers classified?* Nerve fibers are classified as medullary and non-medullary. The difference lies in that the medullary sheath, or white matter of Schwann, is present in the first class and absent in the second class.
79. *Describe neuroglia.* Neuroglia is a special supporting network of tissue which holds together the neurones, nerve cells, and nerve fibers. The neuroglia consists essentially of the same structures throughout the body, varying only in consistency.
80. *Describe the nerve trunks.* The nerve fibers are distributed to the different parts of the body in cord-like bundles of varying size, which are called, anatomically, nerves. These nerves contain all kinds of nerve fibers. The nerve fibers are grouped into bundles called "funicula." Each funiculus is surrounded by a connective tissue covering called the "perineurium." The various funicula are bound together loosely and are invested by a connective tissue envelope called the "epineurium." In this latter structure are found the blood vessels and lymphatics that nourish the nerve.
81. *What is blood?* Blood is a fluid circulating within the blood-vascular system and is composed of a clear, almost colorless plasma, or "liquor sanguinis," in which is suspended the blood cells.
82. *How are the blood cells classified?* The blood cells are classified into two chief kinds—(a) colored cells, or erythrocytes, and (b) colorless cells, or leucocytes.



83. *What imparts the red color to blood?* The blood is colored red due to the presence of hemoglobin contained in the erythrocytes. The individual cells are only faintly tinted, but in mass they give the characteristic color to the blood as well as a degree of opacity.
84. *Describe the colored blood cells.* The colored blood cells are small biconcave disks without nuclei. The average size of the erythrocyte is 7.8 microns in diameter. There are about 5,000,000 red cells in a cubic millimeter of blood in the male and slightly less in the female.
85. *Describe the colorless blood cells.* The colorless blood cells appear as pale, nucleated elements which have a pearly tint. Their shape varies, being irregularly spherical or oval. They are larger than the erythrocytes and are less numerous. The average size is 10 to 12 microns in diameter and the range from 5,000 to 10,000 in a cubic millimeter. On a warm slide, the white blood cells show that they have the power of ameboid movement, changing both their shape and their position.
86. *How are the colorless blood cells classified?* The colorless blood cells are classified into five divisions, as follows: (1) small lymphocytes, (2) large lymphocytes, (3) large mononuclear leucocytes, (4) polymorphonuclear leucocytes, (5) eosinophiles.
87. *Describe the small lymphocytes.* The small lymphocytes are about 20 to 30 per cent of all colorless blood cells. They are distinguished by a large deeply staining nucleus that occupies practically the entire cell. The average diameter is 7.5 microns.
88. *Describe the large lymphocytes.* The large lymphocytes are about 5 to 6 per cent. of all colorless cells. These cells are larger than the preceding variety (12 to 15 microns) and have a small oval nucleus. The cytoplasm is plentiful and non-granular.
89. *Describe the large mononuclear leucocytes.* The large mononuclear leucocytes are about 1 to 2 per cent. of all colorless cells. They vary in size from 10 to 15 microns and have a palely stained nucleus. The cytoplasm is plentiful and fine neutrophilic granules are often present.
90. *Describe the polymorphonuclear leucocytes.* The polymorphonuclear leucocytes are 70 per cent. of all colorless cells and are the most conspicuous. The nucleus is deep staining and at first observation appears to be multiple. Close inspection shows the nucleus to consist of several segments which are connected by delicate filaments. Occasionally two or more isolated nuclei do occur. The cytoplasm is abundant and contains fine granules. The cells average 10 microns in diameter.
91. *Describe the eosinophiles.* The eosinophiles are 2 to 4 per cent. of all colorless cells, resemble the polymorphonuclear leucocytes in many particulars, but the cytoplasm contains coarse, highly refracting granules which have a decided pink hue.

92. *Are any other cellular structures found in blood?* Yes. Basophiles, mastcells, myelocytes, and blood-plates are also found in blood.
93. *Describe lymph.* Lymph corresponds very closely to the blood in that it is a circulating fluid containing two parts—the plasma and the lymph corpuscles. The lymph plasma is like that of the blood, representing the intercellular structure. The lymph corpuscles possess all of the characteristics of the colorless blood cells, but the quantity and proportion vary more markedly in the lymph than in blood. There are no colored cells in the lymph so that the red color is absent.
94. *What is the vascular or circulatory system?* The vascular, or circulatory system, includes the organs concerned in conveying throughout the body the fluids which bring to the tissues nutrient materials and oxygen necessary for their life and to carry away the waste materials produced during metabolism. The vascular system is divided into two parts: (a) the blood vascular system, which includes the organs that circulate the blood, (b) the lymphatic system, which includes the organs that convey the lymph.
95. *Describe the blood vascular system.* The blood vascular system consists of (1) the heart, whose action is that of a force pump, which drives the blood through (2) the vessels. The vessels are divided into three divisions: (a) the arteries, which carry the blood from the heart to the tissues; (b) the capillaries, which are delicate structures, permitting the nutrient fluid to come in close contact with the tissues; (c) the veins, which carry the blood back to the heart. The arteries blend into capillaries and these in turn blend into the veins.
96. *What is the general structure of blood vessels?* All of the vessels and the heart are lined with a layer of endothelium which is continuous throughout the body. This is called the “tunica intima,” and in the capillaries constitutes the entire vessel wall. In the other vessels the endothelium rests upon a fibro-elastic structure, the elastic portion of which predominates. External to the intima except in the capillaries, there occurs a thick coat containing non-striated muscle, elastic tissue and fibrous tissue called the “tunica media.” The outermost coat is called the “tunica adventitia or externa” and is very strong. These three coats of the vessels are not clearly separated, the outer two blending into each other, so that the classification is more or less theoretic.
97. *Describe the heart.* The walls of the heart, like those of the larger blood vessels, are composed of three general layers. The inner layer is called the “endocardium” and is composed of an endothelial lining resting upon a fibro-elastic basement membrane. The valves of the heart are folds of endocardium reinforced by fibro-elastic tissue. The middle layer of the heart is called the “myocardium” and is made up of muscle fibers. The external layer is called the “epicardium.” Like other serous membranes, it

consists of a single layer of endothelial cells that covers the free surface of the heart. Around the whole is a fibrous structure lined with serous membrane called the "pericardium."

98. *Describe the lymphatic system.* The lymphatic or lymph-vascular system consists of a universally present system of channels, some of which are definite tubes called "lymphatic vessels" and others which are ill-defined clefts between the bundles of connective tissue called "lymph spaces." The vessels contain the lymph in which is found the lymphocytes or corpuscles. The lymphatics resemble the veins from which they probably originate and into which they finally pour their contents.
99. *What is mucous membrane?* Mucous membrane is the tissue which lines all of the cavities within the body connected with the outer air. It blends with the skin at the openings of the digestive, respiratory, and genitourinary tracts. The mucous membrane not alone lines these cavities, but continues into the ducts and tubes of the glands.
100. *Describe the structure of mucous membrane.* Every mucous membrane is made up of two definite portions: (a) the free surface made up of epithelium and protecting the delicate structures beneath; (b) the tunica or membrana propria, which is a network of connective tissue which contains the blood vessels, nerves, lymphatics, etc. The epithelium varies in structure depending upon its location. Thus, in the upper part of the digestive tract where the food passes over it in the rough state, the epithelium is of the stratified squamous type. In the intestine, where absorption takes place, it is the simple columnar form.
101. *What are glands?* Glands are composed of specialized epithelial structures which secrete substances upon the free surface for various purposes.
102. *How are glands classified?* Glands are classified into two main classes according to the arrangement of their cells: (a) tubular, (b) alveolar or saccular. Either form may be simple or compound.

## CHAPTER III.

# PHYSIOLOGY

1. *Define animal physiology.* Animal physiology is the study of the phenomena of growth, movement, mentality, and reproduction.
2. *What is special physiology.* Special physiology is the study of the vital phenomena or functions exhibited by the organs of any individual animal.
3. *What is comparative physiology?* Comparative physiology is the study of the comparison of the vital phenomena or functions exhibited by the organs of two or more animals with a view to unfolding the points of resemblance and dissimilarity.
4. *What is human physiology?* Human physiology is the study of the functions of the organs of the human body in a state of health.
5. *How is the body of man divided?* The body of man is divided into two portions—(1) the axial and (2) the appendicular.
6. *What is the axial portion?* The axial portion consists of the head, neck, and trunk.
7. *What is the appendicular portion?* The appendicular portion consists of the extremities.
8. *What is the characteristic feature of the axial portion of the body?* The characteristic feature of the axial portion is the bony, segmented axis which is called the vertebral column, or backbone. All animals having such a vertebral column are classed as “vertebrata” or vertebrates.
9. *Of what importance is the vertebral column to the body?* The vertebral column is regarded as the foundation in the plan of organization of all higher animals and the center around which the body is developed and arranged with a certain degree of conformity. At the top of the column rests the skull and within it the brain, and at the lower end the column terminates in a short tail-like process called the coccyx. Through the center of the vertebral column passes the spinal cord, from which the nerves originate and which leave the cord along its course.
10. *How is the trunk of the body divided?* The trunk is divided by a muscular structure called the diaphragm, into an upper section called the thorax and a lower section called the abdomen.

11. *What is the thorax?* The thorax is a cavity which contains the heart, lungs, the large blood vessels, and the gullet or esophagus.
12. *What is the abdomen?* The abdomen is a cavity which contains the stomach, intestines, kidneys, ureters, bladder, liver, pancreas, etc.
13. *What is the pleura?* The pleura is a serous membrane which lines the lungs and the thoracic cavity.
14. *What is the peritoneum?* The peritoneum is a serous membrane which lines the abdominal cavity and covers most of the organs found therein.
15. *Describe the physiologic association of the organs of the body.* While each organ serves some specific purpose, it is found that throughout the entire body the various organs functionate in harmony and cooperation with other organs. This harmonious cooperation is necessary to the life of the body. Thus, we have the various organs of digestion, all doing some specific duty, yet blending each individual function into what is known as digestion. Thus, the organs have been grouped and the mouth, stomach, intestines, and the glands connected therewith have been classified as the digestive apparatus.
16. *Mention the various groups of physiologic apparatus in the body.* (1) The digestive apparatus, made up of the mouth, stomach, and intestines, and the glands connected with them; (2) the absorptive apparatus, made up of the lymphatics and the capillary vessels connected with the villi of the intestines; (3) the circulatory apparatus, made up of the heart and blood vessels; (4) the respiratory apparatus, made up of the lungs and trachea, together with the diaphragm and the walls of the chest; (5) the urinary apparatus, made up of the kidneys, ureters and bladder; (6) the neuro-muscular apparatus, made up of the nerves and muscles and which produces motion, etc.
17. *What is the chemical composition of the body?* The body is made up of numbers of complex chemical compounds which upon analysis into the elements show the following: oxygen, 72 per cent.; hydrogen, 9.1 per cent.; nitrogen, 2.5 per cent.; carbon, 13.5 per cent.; phosphorus, 1.15 per cent.; calcium, 1.3 per cent.; sulphur, 0.147 per cent.; sodium, 0.1 per cent.; potassium, 0.026 per cent.; chlorine, 0.085 per cent.; fluorine, iron, silicon, magnesium, in small and variable amounts.
18. *What is a cell?* A cell is a microscopic structure which is the primary unit of the body, to which every exhibition of life is to be referred.
19. *Describe the structure of a cell.* Cells vary in size and shape throughout the body, but a typical cell is made up of a gelatinous substance forming the body of the cell and called protoplasm, within which is found a small spheric body called the nucleus.

The shape of the cell varies with the tissue in which it is found, being round, cylindric, fusiform, polygonal, or stellate. (A detailed description of the cell will be found in the quiz on histology.)

20. *What are the manifestations of cell life?* All cells exhibit three fundamental properties of life, viz, growth, nutrition, and reproduction.
21. *What is metabolism?* Metabolism is a term which indicates the power of the cell to select from surrounding nutritive materials substances necessary for its growth and development and to throw off substances for which it has no use. The first stage is called anabolism and the second catabolism.
22. *How are the tissues of the body classified?* The tissues of the body are classified as follows: epithelial, connective, muscular, nervous, blood, and lymph.
23. *What are the functions of epithelial tissue?* Epithelial tissue serves as a protective covering on the surface against injurious influences; it promotes absorption in the skin, mucous membranes, and in the air vesicles of the lungs; it helps to form secretions and excretions, the glands being lined with epithelial cells.
24. *What are the functions of connective tissue?* As the name implies, the connective tissues serve as a bond of connection between the individual parts of the body, at the same time affording a basis of support for muscle, nerve, and gland tissues.
25. *What are the divisions of connective tissue?* Connective tissue is divided into the following varieties: areolar, adipose, retiform, fibrous, elastic, cartilage, and bone.
26. *What is the function of areolar tissue?* The areolar tissue serves to unite the skin and mucous membrane to the structures upon which they rest. It forms sheaths for the support of blood vessels, nerves, and lymphatics and unites into compact masses the muscles of the body, etc.
27. *What is the function of adipose tissue?* Adipose tissue is widely distributed and assists in the prevention of too rapid radiation of heat from the body. It acts as a cushion to absorb shock, gives form and roundness and diminishes angularities. It is utilized by the body when the supply of food is diminished for tissue construction or for oxidation purposes.
28. *What is the function of retiform tissue?* Retiform tissue is a modification of areolar tissue and supports the lymph corpuscles.
29. *What is the function of fibrous tissue?* Fibrous tissue is abundantly distributed throughout the body, constituting almost entirely the ligaments and tendons. It is tough and inelastic, and fulfills various mechanical functions in the body. It is very pliant, bending easily in all directions.



30. *What is the function of elastic tissue?* The fiber of elastic tissue, as the name implies, is quite elastic, stretching as much as 60 per cent. before breaking. It is usually found mixed with fibrous tissue and serves to give elasticity to various structures. In some places, such as the middle coat of the large blood vessels and in special ligaments, it is found unmixed, thus giving great elasticity to these structures.
31. *What is the function of cartilage?* Cartilage is of different kinds. It is found in joints, where it acts as a protective to the ends of the bones, and absorbs shock. In some places it is more fibrous and here it helps maintain apposition of the bones, and in diminishing the effects of shock and pressure to the bones. In other places it contains elastic fibers and here it permits flexibility and elasticity.
32. *What is the function of bone?* Bone affords attachment for muscles, thus making motion possible; in places it forms a hard, solid protection for the vital organs, such as the skull and the chest.
33. *What is the function of the skeleton?* The skeleton, a bony framework, acts as one of the three primary mechanisms for the accomplishment of work in the body. All of the various movements of the body, while they depend upon the nerves and muscles, must be carried into effect through the skeleton. The axial portion of the skeleton gives fixity and rigidity to the body while the extremities impart extreme mobility. The bones of the arms and legs may be considered a system of levers, moving around the joints which act as fulcrum for these movements.
34. *What is the physiology of muscles?* Muscles produce movement of the structures to which they are attached by their property of being able to contract when stimulated by an impulse from the nervous system. Most of the muscles are attached to the skeleton of the body so that when they contract, they change not only the position of the bones in relation to each other, but also the individual's position in relation to surrounding objects. Thus, the muscles are the active organs of motion and locomotion, whereas the bones and joints are but passive agents.
35. *How are muscles classified?* Muscles are classified according to the function as voluntary and involuntary muscles.
36. *What are voluntary muscles?* Voluntary muscles, also called skeletal muscles, are those whose action is controlled by an act or effort of volition. These muscles are under the control of the will.
37. *What are involuntary muscles?* Involuntary muscles are those muscles that functionate independent of the will.
38. *Describe how the nerves enter a muscle.* The nerves which carry the stimuli to a muscle enter at the geometric center. Each muscle fiber is supplied with a nerve fiber. The nerve fiber enters the muscle fiber near its center. The stimulus that is conveyed to

the muscle fiber acts first upon the center and then travels toward the ends.

39. *What is rigor mortis?* Rigor mortis is a state in the muscle after death in which the muscles become extremely rigid and contracted, and which lasts for from one to five days. The rigidity first appears in the muscles of the lower jaw, next in the abdomen and upper extremities, and finally in the trunk and lower extremities. There are marked chemical changes in the muscles during this period.
40. *What is meant by the term tonus?* Tonus, or tonicity, is a state of normal elastic tension in a muscle, by virtue of which the muscle is kept in shape and ready to functionate in response to a stimulus.
41. *What is meant by the term clonus?* Clonus is a form of convulsion marked by contractions and relaxations of a muscle, occurring in rapid succession.
42. *What is meant by the term fatigue?* Fatigue as it refers to a muscle means that state in which the muscle is completely relaxed and will not respond to a stimulus.
43. *What is meant by the term "muscle excitability" or "muscle contractility"?* These terms are employed to denote that property of muscle tissue by virtue of which it contracts or shortens in response to various stimuli. This property is usually associated with the activity of the nervous system, but it is an independent endowment and persists after all nervous connections are destroyed.
44. *How can it be proven that muscles contract without nervous stimuli?* If the nerve terminals are destroyed the muscles become completely relaxed. The strongest stimuli to the nerves will fail to produce a contraction. However, an external stimulus applied directly to the muscle will at once produce the characteristic contraction.
45. *How are muscle contractions classified?* Muscle contractions are classified as either voluntary or reflex.
46. *Describe voluntary contraction in muscle.* When an individual wills to move a certain part of the body an impulse is transmitted from the brain through the spinal cord and nerves to the muscle or muscles which move that part.
47. *What is a reflex?* A reflex is caused by a peripheral stimulus which is transmitted to the spinal cord, and here it is reflected outward through the same nerves to the muscle which then contracts.
48. *Can muscles contract without some stimulus?* No. Although muscle tissue is highly irritable, it will not contract unless some form of stimulation is applied.
49. *Classify the stimuli which cause muscle contraction.* The stimuli



which cause the contraction of muscle are classified as follows: (1) mechanical, (2) chemic, (3) physical, (4) electric.

50. *Which of these stimuli are most commonly used to cause muscle contraction?* Electricity is the most common agent employed to produce muscular contractions.
51. *What changes take place in a muscle when it contracts?* The change in form is the most obvious. The muscle becomes shorter and thicker. There is also a shrinking in the volume of the muscle in contraction. The extensibility of the muscle is increased and its elasticity is correspondingly diminished. There are several chemical changes that take place; oxygen is absorbed and the production of carbon dioxide is increased. The muscle also becomes warmer.
52. *How are muscles classified according to their action on the various parts of the body?* Muscles are classified or grouped in accordance with the kind of motion they produce: (1) those that alternately bend and straighten a joint are called flexors and extensors, (2) those which turn the bone around its own axis without producing any great change in position are called rotators, (3) those which permit angular motion to and from the median line are called adductors and abductors.
53. *What is posture?* By posture is meant one of the various positions the body can assume owing to its system of joints, levers, and muscles, such as standing and sitting.
54. *What is locomotion?* Locomotion is the movement of the body from one place to another and includes walking, running, swimming, etc.
55. *What is a lever?* A lever is a mechanical device which exerts great power. In the body, the muscles working on the bones through the medium of the joints, form levers. The muscles furnish the power, the bone acts as the lever, and the joint acts as a fulcrum around which the motion occurs, and the part is thus lifted and moved.
56. *How are levers classified?* Levers are classified as levers of the first order, levers of the second order, and levers of the third order.
57. *What are levers of the first order?* In levers of the first order, the fulcrum lies between the weight and the power; example, the elevation of the trunk from a flexed position and the movement of the skull backward and forward on the spine.
58. *What are levers of the second order?* In levers of the second order, the weight lies between the power and the fulcrum; example, the raising of the body on the toes.
59. *What are levers of the third order?* In levers of the third order, the power lies between the fulcrum and the weight; example, the flexion of the forearm.

60. *Describe the posture known as standing.* Standing is that position of equilibrium in which a line drawn through the center of gravity falls within the area of both feet placed upon the ground.
61. *How is the position of standing maintained?* The standing position is maintained by firmly fixing the head on top of the spinal column by the action of the muscles on the back of the neck; by making the spinal column rigid; the center of gravity now behind both hip joints. The trunk is now balanced on the hip joints, and is kept from falling backward by contraction of the muscles of the thigh and leg. The center of gravity is between the sacrum and the last lumbar vertebra, and the vertical line touches the ground between the feet and within the base of support.
62. *Describe the sitting position.* The sitting position is a posture in which the body is balanced on the lower portions of the bones of the pelvis called the tuber ischii. The trunk and head together form a rigid column and the vertical line passes between these two bones.
63. *Describe the physiology of walking.* Walking is a complicated act in which nearly all of the voluntary muscles of the body are involved. The muscles either take part in the actual propulsion of the body forward or they assist in maintaining the balance of the body. Walking may be defined as a progression in a forward horizontal direction, due to the alternate action of both legs. In walking, one leg becomes for the time being the active or supporting leg, carrying the head and the trunk, and the other is the passive but progressive leg, which later becomes the active leg when its foot touches the ground. As the body is thrust forward into space when the step is begun, the weight passes from the center, forward, and when sufficiently advanced, is caught by the leg being thrust forward beyond this point. Thus, the body is prevented from falling. So that really walking is a series of movements in which the body falls forward and is caught by the advancing leg before the body actually falls. This requires perfect muscular co-ordination of all the muscles, both in the legs and arms as well as in the head and trunk. As an evidence of this, if one watches a child that is just beginning to walk, occasionally it will fall forward and strike the ground on its hands and knees. This is due to the fact that muscular co-ordination is not sufficiently well developed and the child falls before the advancing leg can catch the body weight.
64. *What is running?* Running is an act of propelling the body forward and is distinguished from walking in that at a given moment, both feet are off the ground and the body is raised in the air. The muscular co-ordination is much the same as in walking, except that greater effort is necessary to maintain equilibrium.
65. *What is nerve tissue?* The tissue called nerve tissue unites and co-ordinates the various organs and tissues of the body and brings the individual into relationship with the outer world. It is di-

vided into two systems, the cerebro-spinal system and the sympathetic system.

66. *What are nerve trunks?* Nerve trunks, or nerves, are bundles of nerve fibers bound together by connective tissue and which serve to connect the brain and spinal cord with the rest of the tissues.
67. *How are nerves classified?* Nerves are classified into two classes, the efferent and the afferent nerves.
68. *What are efferent nerves?* Efferent nerves are those which transmit energy or impulses from the brain and spinal cord to the peripheral organs.
69. *What are afferent nerves?* Afferent nerves are those which transmit nervous impulses from the peripheral organs to the brain and spinal cord.
70. *How are the efferent nerves classified?* The efferent nerves are classified according to their characteristic form of activity as follows: (1) motor or muscle nerves which convey impulses to the muscles and cause muscular contraction; (2) secretory nerves, which act upon the glands and cause the formation of secretions peculiar to the gland; (3) vaso-motor nerves, which convey impulses to the blood vessels and cause dilation (vaso-dilators) or constriction (vaso-constrictors) of the vessel; (4) inhibitor nerves, which cause a slowing or complete stopping of the rhythmic action of organs; (5) accelerator nerves, which cause an increase in the rhythmic action of organs.
71. *How are the afferent nerves classified?* The afferent nerves are classified in accordance with the character of the sensations to which they give rise as follows: (1) sensory nerves, which give rise to conscious sensations in the brain and divided into nerves of special sense, such as the senses of pain, sight, hearing, etc.; and the nerves of general sense, such as discomfort, thirst, hunger, fatigue, etc.; (2) reflex nerves, which convey impulses to the nerve centers and cause a transmission of impulses through efferent nerves to muscles, glands, etc.; (3) inhibitor nerves, which are capable of reflexly retarding the activity of nerve centers or peripheral organs.
72. *What is meant by the term nerve degeneration?* If any nerve be divided in any portion of its course, certain structural changes take place in the peripheral portion to which the term degeneration is applied. The portion connected with the brain and spinal cord remains unchanged.
73. *Discuss reflex action.* There are many actions taking place in the body in which the will plays no part and which are classified as involuntary. Among these are the various muscular movements, the action of the various glands, and the contraction and dilation of the blood vessels. All of these various acts are the result of stimulation of an afferent nerve and because they take

place independent of the brain or of the will, are called reflex actions. Some examples of reflex actions are the extension of the leg when the patella is struck a sudden blow; the jerking up of the arm if one of the fingers accidentally touches something hot or sharp; the increase in the flow of perspiration when the outside temperature is increased.

74. *How is a reflex action brought about?* When an impulse is carried from the periphery to the spinal cord by an afferent nerve, instead of being carried further up into the brain, it passes into a nerve cell from which it is transmitted to an efferent nerve which is distributed to the muscle, gland, or vessel as the case might be.
75. *Discuss the stimulation of nerves.* Nerves do not possess the power of spontaneously generating nerve impulses. The nerves become active only when aroused by a stimulus. The stimulus may act either on the central or the peripheral portion of the nerve. In the case of motor nerves, the stimulus is within the nerve cell, while in the sensory nerves, the stimulus is at the periphery. Nerves respond to a stimulus according to their habitual function; thus, sufficient stimulation of a sensory nerve causes the sensation of pain, etc. The peculiarity of nerve function depends entirely upon the peculiarities of its central and peripheral end organs and not upon the stimulus or any special construction of the nerve itself.
76. *How are nerve stimuli divided?* Nerve stimuli are divided into general stimuli and special stimuli.
77. *Mention the various general stimuli.* The general stimuli are those agents which are capable of exciting a nerve in any part of its course and are as follows: (1) mechanical, such as a blow, pressure, puncture, etc.; (2) thermal; (3) chemic; (4) electric; (5) the normal physiologic afferent and efferent stimuli.
78. *Name the various special stimuli?* The special stimuli are those agents which act upon the nerves only through the medium of the end organs and are as follows: (1) light acting on the end organs of the nerves of the eye; (2) sound acting on the end organs of the nerves of the ear; (3) heat, acting upon the end organs in the skin; (4) chemic agencies, acting upon the end organs of the nerves of taste and smell.

## Digestion

79. *What is food?* Food is that which is eaten to supply the necessary nutritive elements to the body.
80. *How are foods divided?* Foods are divided into three great classes: (1) carbohydrates, (2) proteids, (3) oils and fats. To this is added the inorganic salts, water and accessory foods such as tea, coffee, alcohol, etc.
81. *What are carbohydrates and what is their function as a food?* The carbohydrates, or starches, are chemically composed of carbon,

oxygen and hydrogen and when taken into the body are converted into sugar and temporarily stored in the liver. The sugar is broken up in the process of digestion forming carbon dioxide and water and in this reaction a large quantity of heat is produced. Examples of carbohydrates are potatoes, bread, cereals, etc.

82. *What are proteids and what is their function as a food?* Proteids or proteins are complex chemical substances found in animals and plants and are composed of carbon, oxygen, hydrogen, nitrogen, and sometimes sulphur, phosphorus, and iron. When taken into the body they are converted into peptones which are absorbed and utilized for tissue repair and tissue building, and in breaking down into simpler compounds, some heat is generated. Examples of proteids are meat, eggs, green vegetables, etc.
83. *What are oils and fats and what is their function as a food?* The oils and fats are chemical compounds which are known as esters. When taken into the body they are acted upon chemically and are absorbed as fatty acids. Some of the oils and fats are taken directly into the system in the form of small drops which become adipose tissue. Some are oxidized and give off heat. Examples of oils and fats are butter, fatty meats, olive oil, etc.
84. *What is the function of water as a food?* Water is present in all the tissues of the body. It promotes absorption of materials from the digestive tract and acts as a solvent for the various ingredients of the blood and lymph. It also hastens the absorption of waste matter from the tissues and promotes their speedy elimination from the body.
85. *What is the function of the inorganic salts as food?* Sodium chloride gives taste to the food, excites the flow of digestive fluids, promotes absorption of proteids, and furnishes the chlorine for the hydrochloric acid found in the stomach. The potassium salts are also essential to the body. Animals become weak without them. In small doses they increase the force of the heart beat and thus increase the circulation of the blood. Calcium phosphate and calcium carbonate give solidity to the tissues, especially the bones and teeth.
86. *What is the function of the accessory foods?* The accessory foods when taken in moderation overcome the fatigue and unrest which is a result of excessive physical and mental exertion. Coffee increases the action of the intestinal glands and acts as a laxative. The caffeine contained therein stimulates heart action and raises blood pressure. Alcohol, when taken in small quantities, undergoes oxidation, thus supplying heat and force, and thus far is a food. It excites the glands of the stomach into increased action, thus improving digestion. It also stimulates the action of the heart and the nerve centers. When taken in excess, it is eliminated by the lungs and kidneys. When taken over a long period of time, alcohol impairs digestion, and retards muscular power. It



destroys the structure and composition of the brain cells and the spinal cord. The connective tissue of the body is increased and subsequently contracting, gives rise to sclerosis.

87. *Why is it essential that the body receive a proper combination of the three great divisions of food?* One class of food will not maintain the body for any length of time. If any one is taken in excess, or if any one is eliminated from the diet, disease is the result.
88. *What is the function of foods generally in the body?* The function of foods generally is to supply the materials necessary for tissue growth and tissue repair and for the maintenance of body heat, so as to supply energy, which is expended daily in the form of motion and heat. All of the energy of the body is due to the chemical changes going on in the body, principally the oxidation of food.
89. *What is a calorie?* A calorie is the amount of heat required to raise the temperature of one kilogram of water one degree centigrade. The calorie is the unit of measuring the heat generated by the various foods taken into the body.
90. *What is digestion?* Digestion is a physical and chemical process by which the food taken into the alimentary canal is liquified and its nutritive principles are converted by the digestive juices into new substances which are absorbed into the blood.
91. *What is the digestive apparatus?* The digestive apparatus consists of the alimentary canal and its appendages, the teeth, salivary, gastric and intestinal glands, liver, and pancreas.
92. *What is the alimentary canal?* The alimentary canal consists of the mouth, the esophagus or gullet, the stomach, the large and small intestine and the rectum.
93. *What are the stages of digestion?* There are seven stages of digestion: (1) prehension, (2) mastication, (3) insalivation, (4) deglutition, (5) gastric digestion, (6) intestinal digestion, (7) defecation.
94. *What is prehension?* Prehension is the act of conveying the food to the mouth and is accomplished by the hands, lips, and teeth.
95. *What is mastication?* Mastication is the chewing of the food and is accomplished by the teeth and the lower jaw. This process divides the food and presents a larger surface for the action of the digestive fluids. The teeth vary in shape for different kinds of food, and those of the lower jaw move upon those of the upper jaw in various movements. During the process of mastication, the food is kept between the teeth by the action of the muscles of the tongue and cheek.
96. *What is insalivation?* Insalivation is the process of incorporating the saliva with the food.

97. *What digestion takes place in the mouth?* The saliva contains a ferment called ptyalin, which converts starches into sugar. The mucine, another substance found in saliva, moistens and clumps the food so as to make it easier to swallow.
98. *What is deglutition?* Deglutition, or swallowing, is the act of passing the food from the mouth into the stomach. It is divided into several stages the first of which is voluntary and the second reflex and the third involuntary. The first stage consists of closing the mouth momentarily stopping breathing, placing the tongue against the roof of the mouth and throwing the bolus of food backward. The second stage is where the palate is made tense, the bolus is grasped by the muscle of the pharynx and rapidly forced into the esophagus. In the third stage the bolus is forced through the esophagus into the stomach by the contraction of the involuntary muscles of that organ.
99. *What is gastric digestion?* Gastric digestion is the digestion that takes place in the stomach. The gastric, or stomach juice, is composed of free hydrochloric acid, the enzyme pepsin, and a second ferment called rennin. The pepsin converts proteids to peptones in the presence of hydrochloric acid, which latter serves to keep the food acid and prevents fermentative changes. The rennin acts upon milk, converting the caseinogen to casein and albumin.
100. *What is intestinal digestion?* Intestinal digestion is the digestion that takes place in the small intestine. The pancreatic juice which is secreted by the pancreas, contains three ferments called amyl-opsin, trypsin, and steapsin. The amyl-opsin converts starches into sugars, the trypsin converts proteids into peptones, and the steapsin acts upon the oils and fats, saponifying them and forming fatty acids and glycerine.
101. *What is bile?* Bile is a golden-brown, viscid fluid which is formed and discharged by the liver. It is both a secretion and an excretion. It helps in the emulsification of fats, it prevents putrefactive changes in the food, it stimulates the secretion of the intestinal glands, stimulates peristalsis and gives color to the stool.
102. *What is peristalsis?* Peristalsis is a wave-like movement which takes place in the digestive tract and which serves to move its contents forward.
103. *What is defecation?* Defecation is the voluntary act of extruding the feces from the rectum and is accomplished by the relaxation of the sphincter ani muscle and the contraction of the muscles of the rectum.
104. *Briefly describe the digestive process from the mouth to the anus.* The food enters the mouth where in an alkaline medium the starches are acted upon, the food moistened and formed into a bolus and then swallowed. It then passes down the esophagus by peristalsis into the stomach where in an acid medium the pro-



teids are converted into peptones and casinogen is converted into casein. In a semi-fluid state, called chyme, it then passes through the pyloric opening in the stomach into the small intestine. Here it is acted upon by the three ferments, in an alkaline medium and as peristalsis continues, it passes into the large intestine. This organ absorbs the liquid from the digestive material and it becomes more solid. It now takes on the characteristics of feces and then passes into the cavity at the lower end of the intestines called the rectum. By the act of defecation the feces are extruded through the anus.

## The Blood and Blood Circulation

105. *What is blood?* Blood is a nutritive fluid containing all of the elements necessary for tissue repair; it also contains waste matter which it conveys to the organs of excretion.
106. *Describe the composition of the blood.* Blood is made up of two portions: (1) the fluid portion, called liquor sanguinis or plasma, which is clear and colorless and in which floats (2) the cellular elements which are called red blood cells or erythrocytes and white blood cells or leucocytes.
107. *What is the composition of plasma?* Plasma is composed of water, albumin, paraglobulin, fibrinogen, mineral salts, etc. Oxygen, carbonic acid gas, and nitrogen are present in varying proportions.
108. *Where do the corpuscles originate?* The red corpuscles originate from colorless, nucleated cells called erythroblasts found in bone marrow and are destroyed in the spleen. The white cells originate from the lymphocytes of the adenoid tissue.
109. *What is blood coagulation?* When the blood is withdrawn from the body and allowed to be exposed to the air it becomes thick and viscid in about five minutes. This gradually increases until it assumes a jelly-like consistency. When this is complete the mass contracts and a clear, straw-colored liquid oozes out. This is called serum. This continues for about twenty-four hours when coagulation is complete.
110. *What is the difference between living and coagulated blood?* The living blood contains the plasma and corpuscles, the plasma containing fibrinogen, etc. The dead blood contains the serum and the clot which latter contains the corpuscles and fibrin.
111. *What retards coagulation?* Retention in living vessels, neutral salts in excess, inflammatory conditions of the system, exclusion from air, all retard coagulation.
112. *What hastens coagulation?* A temperature of 100 degrees Fahrenheit, contact with the air and rough surfaces, and rest, all hasten coagulation.

113. *Does the composition of living blood remain constant?* No. The composition of living blood varies in different parts of the body. The arterial blood differs from the venous in that it coagulates more readily and contains more oxygen and less carbon dioxide. So, too, in the portal vein, the composition of the blood will change, depending on the stages of the digestive process, etc.
114. *What is the circulatory apparatus?* The circulatory apparatus, by which the blood is carried to all parts of the body, consists of the heart, which is the central organ, and which is connected to a system of vessels called arteries, capillaries, and veins.
115. *Describe briefly the course of the blood through the heart.* The veins terminate at the right auricle and the venous blood then passes through that chamber through the tricuspid valve into the right ventricle. It then flows into the pulmonary artery and is carried to the lungs for aeration. From the lungs it passes through the pulmonary veins to the left auricle, then through the bicuspid or mitral valve into the left ventricle and then into the aorta, which is the beginning of the arterial system.
116. *Describe the flow of the blood through the blood vessels.* The blood enters the arteries under great pressure, due to the driving action of the heart and the resistance offered by the walls of the arteries. As the blood enters the capillaries, the velocity is reduced due to the increase in the area of the vessels. When the blood again enters the veins, the velocity is increased as the area becomes smaller.
117. *What forces keep the blood in circulation?* The forces that keep the blood in circulation are the action of the heart, the elasticity of the arteries, capillary force, contraction of voluntary muscles upon the veins and respiratory movements.
118. *What is the pulse?* The pulse is the rhythmical dilatation of an artery produced by the increased volume of blood thrown into the vessel with the contraction of the heart. The pulse can easily be felt at any point in the body where an artery is superficial enough to convey the sensation.

## Respiration

119. *What is respiration?* Respiration is that function by which oxygen is taken into the blood and the products of oxidation, namely water and carbon dioxide, are given off.
120. *What is the respiratory apparatus?* The respiratory apparatus consists of the lungs, larynx and trachea.
121. *Where does respiration take place?* Respiration takes place in the tissues. The actual interchange of gases occurs throughout the entire body, the blood and the respiratory apparatus acting as media through which actual respiration is accomplished.

122. *What is the larynx?* The larynx is the upper part of the respiratory tract and is called the organ of voice production. It is a box-like structure made up of nine cartilages connected by fibrous membranes and the vocal cords. It is so arranged that the air can pass in or out, to or from the lungs.
123. *What is the trachea?* The trachea is a tube about four or five inches long which passes from the larynx downward and divides into the right and left bronchi. These in turn re-divide, becoming gradually smaller until they join the lungs.
124. *What are the lungs?* The lungs are two organs situated in the thorax, are conical in shape, pink in color, and of spongy texture. The right lung is made up of three lobes and the left lung is made up of two lobes. The lobes of the lung are made up of the ultimate ramifications of the bronchi within which are found the air vesicles or air cells.
125. *How is the venous blood distributed to the lungs for aeration?* The pulmonary artery passes from the heart to the lungs where the branches become a large plexus of capillaries. These capillaries surround the air vesicles and thus the blood and the air are brought in close contact, being separated only by a thin wall of the air cell and of the capillary.
126. *What is the pleura?* The pleura is a serous membrane which surrounds the lung.
127. *What are the respiratory movements?* The respiratory movements are two—inspiration and expiration.
128. *What is inspiration?* Inspiration is an active process, the result of the expansion of the thorax, in which atmospheric air is introduced into the lungs.
129. *What is expiration?* Expiration is a passive process, the result of the recoil of the thorax, in which the air in the lungs is expelled.
130. *Describe inspiration.* In inspiration the chest is enlarged in all its diameters. This is brought about by the action of various muscles which thrust the sternum, or breast bone, forward and raise the ribs. The diaphragm plays an important part in this.
131. *Describe expiration.* In expiration all the diameters of the chest are diminished. This is brought about by the relaxation of the various muscles which bring about inspiration.
132. *Describe the types of respiration.* The three types of respiration are: (1) abdominal type, most marked in young children regardless of sex, the respiratory movements being effected by the diaphragm and abdominal muscles; (2) superior costal type, seen in the adult female, in which the respiratory movements are more marked in the upper part of the chest; (3) inferior costal type, seen in the adult male, in which the movements are largely produced by the muscles of the lower portions of the chest.

133. *What is tidal air?* Tidal air, or breathing volume of air, is the air that passes in and out of the lungs during normal respiration. It is estimated at from twenty to thirty cubic inches.
134. *What is complementary air?* Complementary air is that amount of air that can be taken into the lungs by forced inspiration in addition to the normal tidal air and amounts to about 110 cubic inches.
135. *What is reserve air?* Reserve air is that which usually remains in the lungs after ordinary respiration, but which can be expelled by forcible expiration. The volume of reserve air is about 100 cubic inches.
136. *What is residual air?* Residual air is that portion which remains in the chest and cannot be expelled after the most forcible efforts. Its volume is estimated at about 100 cubic inches.
137. *What changes occur in the air during respiration?* There is a loss of oxygen, about five cubic inches to 100 cubic inches of air. There is an increase in water vapor and organic matter. There is a gain in carbon dioxide, to the extent of 4.66 cubic inches to 100 cubic inches of air. There is an elevation in the temperature of the air. There is an increase and at times a decrease in the amount of nitrogen and a gain of ammonia.
138. *What effect has the organic matter contained in the expired air have on the body?* When one remains in a room for a long period of time in which the ventilation is poor, drowsiness followed by headache and nausea is a result. This is due to the organic matter that is exhaled and not to the amount of carbon dioxide.
139. *Explain the condition of the gases in the blood.* The oxygen is absorbed from the lungs and is taken up by the hemoglobin in the red cells. It forms a very unstable compound with the hemoglobin, and when it is carried to the tissues, the oxygen is readily given off. The carbon dioxide is absorbed into the blood from the tissues where it goes into solution and is thus carried to the lungs by the veins.
140. *Explain the exchange of gases in the air cells of the lungs.* The oxygen is present in the lungs and the venous blood is present in the capillaries. There is a difference in pressure on both sides of the thin membrane which separates the two, so that the oxygen passes into the capillaries where it is taken up by the hemoglobin, while the carbon dioxide passes into the air cells of the lungs.
141. *What is asphyxia?* Asphyxia is a condition in which the supply of oxygen to the lungs is diminished and the carbon dioxide retained. This condition soon terminates in death. Drowning, choking, etc., are forms of asphyxia. The actual cause of death is paralysis of the heart from overdistention of blood.
142. *Discuss animal heat.* The activity of the various parts of the body is attended by the evolution of heat. Heat is necessary for

the body so that its various organs can properly do their allotted work. The body is constantly losing heat by radiation and by evaporation, but it is able to renew and maintain a fixed standard of heat, regardless of external influences. So, the body in normal health, remains at about the same temperature both winter and summer.

143. *What is the temperature of the healthy body?* The average temperature is 98.6 degrees Fahrenheit. It varies in different parts of the body, being highest where most oxidation takes place, for example, in the muscles and liver.
144. *What external influences affect the temperature of the body?* Exercise will raise the temperature about 1 or 2 degrees; eating a hearty meal or the drinking of alcoholic beverage will also cause a rise in temperature. External temperature affects the body to a slight extent, exposure to cold causing a drop and exposure to heat causing a rise in temperature. Disease is a frequent cause in variation from normal. Some diseases like typhoid fever and pneumonia will cause a rise to 105 to 107 degrees, while cholera will cause a drop to as low as 80 degrees. When high temperatures persist for a period of time, death ensues.
145. *What is fever?* Fever, or pyrexia, is a condition in which the body temperature rises above the normal, 98.6 degrees Fahrenheit or 37 degrees Centigrade.

## Secretion and Excretion

146. *What is secretion?* Secretion consists in the separation of materials from the blood, either waste, or to be utilized for some function in the body. In the former they are termed excretions and in the latter secretions.
147. *Through what medium are secretions made?* The secretion is made through a special structure called a gland, the material which it secretes being previously present in the blood. The gland has the power to take from the blood various nutrient materials and from them it manufactures the secretion characteristic of the gland. Excretions pre-exist as such in the blood. If retained in the body, they have a harmful influence on the composition of the blood.
148. *Mention some secretions.* Some of the common secretions are sebum, mucus, saliva, gastric juice, bile, pancreatic juice, etc.
149. *Mention some excretions.* Some of the common excretions are sweat, urine, and bile.
150. *What are the ductless glands?* The ductless or vascular glands are structures which have no duct and their secretions are absorbed directly into the blood stream. These glands play an important part in the maintenance of body health and in the last few years



much time has been given to the study of their functions and characteristics. Some of the ductless glands are the thyroid, the suprarenal, and the pituitary glands.

151. *What is urine?* Urine is a clear fluid which is excreted from the body by the kidneys. Urine has a characteristic odor, a bitterish saline taste, and an acid reaction. It contains urea, uric acid, mucus, and organic waste matter.
152. *What is the urinary apparatus?* The urinary apparatus consists of the kidneys, ureters, and bladder.
153. *What are the kidneys?* The kidneys are two bean-shaped organs about four or five inches long which have the power of taking from the blood stream various waste products in solution. It is composed of many small tubules which take the waste from the blood and carry it toward the interior portion or pelvis where the fluid is passed into the ureters.
154. *What are the ureters?* The ureters are two membraneous tubes about eighteen inches long which pass, one from each kidney, into the bladder, which they enter in an oblique line.
155. *What is the bladder?* The bladder is a reservoir for the temporary reception of the urine before it is expelled from the body. It is oval in shape when distended and holds about one pint.
156. *What is urination?* Urination, or micturation, is the act of passing the urine from the body. When the bladder becomes filled there is irritation to the nerves and a reflex causes the relaxation of a muscle which is found at the neck of the bladder. When this muscle relaxes and the bladder contracts, its contents is forced out. Urination is a voluntary act, but if urine is retained for a protracted period, the muscle will relax without the aid of the will.
157. *What is the liver?* The liver is a highly vascular, complex gland found attached to the intestines. It is the largest gland in the body and weighs about four and one-half pounds.
158. *What is the function of the liver?* The liver has a variety of functions, chief of which are the secretion of bile, the formation of glycogen, and the formation of urea.
159. *What is bile?* Bile is a fluid manufactured in the liver and is both a secretion and an excretion. It contains substances which are used in the process of digestion and also contains certain waste materials. The bile is stored in the gall bladder which is found on the under surface of the liver.
160. *What are the functions of the skin?* The skin acts as a protective covering to the body, is a touch organ, is an organ of excretion and secretion, is a regulator of body temperature, and also acts as an auxiliary organ of respiration.
161. *What are the functions of the hairs?* The hairs protect the head

from the heat of the sun and from cold and prevent the entrance of foreign bodies into the nose, lungs, ears, etc.

162. *What is the function of the sebaceous glands?* The sebaceous glands secrete an oily fluid which acts as a lubricant of the skin and softens the hairs.
163. *What is the function of the sudoriferous glands?* The sudoriferous or sweat glands, excrete the sweat, which function is going on continuously and helps in maintaining an even body temperature.
164. *What is insensible perspiration?* Insensible perspiration is that perspiration which is formed so gradually that it evaporates as soon as it reaches the surface and passes off without being noticed.
165. *What is sensible perspiration?* Sensible perspiration is that perspiration which forms so rapidly that evaporation is not sufficiently rapid and the fluid forms in beads upon the skin. This occurs when the body is subjected to great heat and exercise.



## CHAPTER IV.

# BACTERIOLOGY

1. *Define bacteriology.* Bacteriology may be defined as that branch of science which has for its consideration the life history of bacteria.
2. *What are bacteria?* Bacteria are microscopic unicellular organisms belonging to the plant group.
3. *Describe the cell substance of bacteria.* The cell substance of bacteria is like cytoplasm in character and is surrounded by a more or less distinct cell wall. In some bacteria this cell wall develops into a distinct capsule which appears as a distended or swollen cell wall or cell membrane.
4. *What is the size of bacteria?* The size of bacteria vary greatly. Some forms are so small that they require specially made microscopes to be seen, yet some other types may be quite large.
5. *How are bacteria classified?* Bacteria are classified in many ways, but the commoner bacteria are classified according to their shape (morphologic classification) into three groups: (a) cocci, (b) bacilli, (c) spirilla.
6. *What are cocci?* Cocci are round or spherical bacteria.
7. *What are bacilli?* Bacilli are rod-shaped bacteria.
8. *What are spirilla?* Spirilla are spiral-shaped bacteria.
9. *How are cocci subdivided?* The cocci are subdivided into a classification according to their grouping or arrangement as follows: (a) micrococci, (b) diplococci, (c) tetracocci, (d) streptococci, (e) staphylococci.
10. *What are micrococci?* Micrococci are those cocci which occur singly.
11. *What are diplococci?* Diplococci are those cocci which occur in pairs.
12. *What are tetracocci?* Tetracocci are those cocci which occur in groups of four.
13. *What are streptococci?* Streptococci are those cocci which occur in chains.

14. *What are staphylococci?* Staphylococci are those cocci which occur in clusters resembling in arrangement a bunch of grapes.
15. *Which of these subdivisions of cocci are most important?* The most important are the diplococci, the streptococci, and the staphylococci.
16. *What are flagella?* Flagella are delicate hair-like projections of the cytoplasm of bacteria by which these organisms are enabled to move about. Some bacteria have but one flagellum while others by the development of a round or oval body, which is highly re-have two or more such processes. All bacteria do not have the power of movement.
17. *How do bacteria reproduce?* Bacteria reproduce in one of two ways: (a) by simple fission, (b) by spore formation.
18. *Describe simple fission.* This method of reproduction is most common and consists of a constriction in the center of the full-grown organism, two cells resulting from the single mother cell.
19. *Describe spore formation.* Spore formation is the rarer form of bacterial reproduction and occurs in two ways: (a) endogenous, (b) arthrozeugous.
20. *What is endogenous spore formation?* This form of spore formation is evidenced by a granular change in the cell contents followed fracture and which is surrounded by a tough resisting membrane. This increases in size, breaks its membrane, and becomes a mature bacterium.
21. *Describe bacterial nutrition.* Bacteria, unlike other plants, do not get carbon dioxide directly from the air and depend upon the more complex compounds for carbon and nitrogen necessary for their nourishment.
22. *What are aerobic bacteria?* Aerobic bacteria, or aerobes, are those bacteria which thrive best on free oxygen.
23. *What are anaerobic bacteria?* Anaerobic bacteria, or anaerobes, are those bacteria which thrive best without oxygen.
24. *What influence has moisture on bacterial growth?* Moisture is necessary for bacterial growth, although some species show decided resistance to dryness.
25. *How does variation in temperature influence bacteria?* Bacteria grow best when the temperature is suitable for them and marked variations in temperature which does not cause their death will stop their reproduction and other of the vital manifestations. There are some bacteria which will live in temperatures as low as 0 degrees C. and others as high as 70 degrees C., but the average range is between 12 and 42 degrees C. Bacteria resist cold better than heat and will live for weeks in a dormant state when subjected to cold.
26. *What is the "thermal death point"?* The thermal death point is

the point of elevation to which the temperature must go before the bacteria are destroyed within ten minutes. Spores require more heat to kill them than do mature bacteria.

27. *How is heat used as a germicide?* Heat is used in two ways as a germicide; the so-called moist heat and dry heat methods. Moist heat is much more efficient than dry heat, and for most practical purposes steam under pressure is used to destroy bacteria.
28. *What are ptomaines?* Ptomaines are substances produced by bacteria which cause the decomposition of proteins. These substances are alkaloids. Some of these are harmless while others are very poisonous. The latter are responsible for that condition of the digestive tract which is called ptomaine poisoning.
29. *What are toxins?* Toxins are substances which are thrown off by bacteria during their metabolic activity. They are not the result of decomposition like ptomaines.
30. *What are endotoxins?* Endotoxins are toxins which remain within the bacteria.
31. *What are exotoxins?* Exotoxins are toxins which are thrown out and absorbed by the surrounding tissues.
32. *What is meant by the term "pathogenic bacteria"?* Strictly, the term pathogenic bacteria refers to those microorganisms which cause disease, but inasmuch as it is difficult to draw the line between those that do and those that do not, the term pathogenic as it relates to bacteria, is used to indicate those which live on living substances. Those that live on dead material are called non-pathogenic bacteria.
33. *How can bacteria be classified as causing a disease?* Before any organism can be credited with causing a specific disease it must comply with a group of requirements set forth by Koch and called after him, "Koch's Postulates."
34. *What are Koch's postulates?* Koch's postulates are as follows: (1) the organism must be present in the tissues or excreta of the animal afflicted with the disease in question; (2) the organism must be isolated and cultivated outside the body on suitable media for several successive generations; (3) the isolated and cultivated organism, when introduced into a suitable animal, must produce symptoms similar to those of the disease; (4) the organisms must be found in the tissues or excreta of the inoculated animal.
35. *What are media?* Media are food materials suitable for the growth of bacteria and include agar agar, blood, milk, egg, potato, etc.
36. *What are infective diseases?* Infective diseases are those diseases which are caused by microorganisms and are spoken of as infections.
37. *What are the principal sources of infection?* The principal sources of infection are: (a) inspiration, (b) entrance through the gas-

trointestinal tract, (c) into the circulation through abrasions in the mucous membrane or skin (d) by insect bites.

38. *What is a local infection?* A local infection is one in which the effect of the entrance of bacteria has been confined to a localized area.
39. *What is a general infection?* A general infection is one which affects the entire system.
40. *What terms are used in connection with general infection?* There are three terms used in connection with general infection: (1) septicemia, (2) sapremia, (3) pyemia.
41. *What is septicemia?* Septicemia is a condition in which the organisms enter the blood stream, thrive in that medium, and are distributed throughout the body.
42. *What is sapremia?* Sapremia is a condition in which the bacteria remain localized, but the toxins are taken up by the blood and lymph streams.
43. *What is pyemia?* Pyemia is a condition in which the localized process has advanced to the necrotic stage and parts of the necrotic material are taken up by the circulation and deposited at some other point. This gives rise to metastatic abscesses.
44. *What is resistance?* Resistance is the power of the body to prevent the successful growth and multiplication of bacteria in the body.
45. *What factors lower the resistance of the body to infection?* The resistance of the body is lowered by the use of alcoholics, hard work, exposure to the extremes of temperature, starvation, constitutional diseases such as diabetes, nephritis, etc., previous forms of infection, etc.
46. *What is meant by the term "immunity"?* By immunity is meant the inherent power of a living body to successfully withstand the invasion of bacteria, toxins, and drugs.
47. *How is immunity classified?* Immunity is classified into: (a) natural immunity and (b) acquired immunity.
48. *Describe natural immunity.* Natural immunity is an immunity which certain individuals possess by reason of race, age, or other general characteristics. It is divided into racial immunity and inherited immunity.
49. *Describe acquired immunity.* Acquired immunity is divided into active and passive immunity. Active acquired immunity is obtained as a result of having had an attack of a pathogenic organism and having overcome it. Thus, one attack of yellow fever immunizes the individual against another attack. Vaccination actively immunizes against smallpox. Passive acquired immunity is obtained by injecting protective substances (anti-toxins) into

the blood. Thus, anti-toxin is given in diphtheria because it contains substances which neutralize the toxins of the disease.

50. *What theories have been advanced to account for the various phenomena of immunity?* There have been two theories advanced to account for the phenomena of immunity: (a) the theory of phagocytosis of Metchnikoff; (b) the side-chain or chemical theory of Ehrlich. Both these theories explain satisfactorily why certain bacteria are unable to infect the body and why the body, once infected, cannot, in many diseases, be again infected.
51. *What apparatus is essential for the study of bacteriology?* The essential bacteriologic apparatus is the microscope, a sterilizer, an incubator, glassware, and chemicals including stains.
52. *Briefly describe the microscope.* The microscope is an instrument which enables us to greatly magnify objects, thus making visible minute substances. It consists of an eye-piece, several objectives, a stage, a condenser, and an iris diaphragm to control the light, and suitable mechanical devices to permit of proper adjustments and focusing. The objectives are usually three in number and are low power, high power, and oil immersion, the latter having the largest magnification and being essential to bacteriologic work.
53. *Describe an incubator.* An incubator is an apparatus which keeps bacteria at the temperature of the body so that they will grow successfully. It consists of a double-wall chamber and between the walls, the space is filled with water. A gas flame or electricity is used as a heating medium and the apparatus is usually equipped with a thermostat which automatically regulates the temperature.
54. *Describe the glassware used in bacteriology.* The glassware includes glass slides, coverslips, test tubes, flasks, beakers, pipettes, and Petri dishes. The latter are shallow, round dishes with covers, used for growing cultures.
55. *What are cultures?* A culture is a growth of bacteria upon or in some suitable medium such as agar agar, etc.
56. *How are cultures prepared?* Cultures are prepared by placing the available bacteria upon or into a medium which will best suit. The selection of the medium and its preparation depends greatly upon the character of the bacterium which is to be grown. The vessel containing the medium is placed into an incubator which is kept at a temperature of 37 degrees Centigrade. It is necessary to exercise great care in preparing cultures so that they do not become contaminated with bacteria in the air or on the materials used. After the culture has been in the incubator for a short time small colonies will appear on the surface of the medium or within it.
57. *What is a pure culture?* A pure culture is one that contains only one species of microorganism.
58. *What is a stab culture?* A stab culture is one that is inoculated

by passing a needle containing the bacteria to be grown deep into the medium which is usually solid gelatine.

59. *What is a streak culture?* A streak culture is one in which the solid medium is streaked across the surface with a wire dipped into the material to be cultivated.
60. *How are bacteria examined under the microscope?* Bacteria are examined either alive or dead. In examining live bacteria, the hanging drop method is used. Dead bacteria are fixed and stained before being examined.
61. *Describe the hanging drop.* The hanging drop consists of a glass slide which has one surface so ground that a small receptacle is formed. A ring of vaseline is placed around the excavated portion. A clean cover glass is selected and a drop of the material to be examined is placed in the center. The glass slide is then carefully lowered upon the cover glass and the vaseline ring will cause the cover glass to adhere to the slide, acting like a seal. The slide is then turned carefully over and the drop of material is now suspended on the under surface of the cover glass.
62. *Describe the examination of dead bacteria.* A thin film of the material is placed upon a glass slide and is allowed to dry. The slide is then passed rapidly through a flame three or four times, smear side up, which fixes the material to the glass and prevents washing off during staining. The slide is then stained with the proper stains and when dry is ready for the microscope. A cover glass is sealed over the specimen with Canada balsam and when dry can be used by placing the immersion oil upon the upper surface of the coverslip.
63. *What are stains?* Stains are substances, usually the basic aniline dyes, which are used for coloring bacteria. Certain bacteria show a peculiar selective power for certain dyes, so that various combinations of stains are used to assist in the identification of certain bacteria.
64. *Mention some of the special stains used in bacteriology.* The two special stains used commonly in staining bacteria are the Gram stain and the Ziehl-Neelson stain.
65. *Describe the Gram stain.* This stain is used as follows: the smear is treated with aniline gentian violet, which is poured on and allowed to remain for three minutes. It is then poured off and the slide treated with a solution of iodine, potassium iodide, and water for two minutes. This changes the purple color to a grayish shade. Alcohol is then poured upon the slide and this is continued until no more color comes off. Bismarck brown is now used as a counter-stain and the slide is washed in water and dried. If the bacteria on examination remain a dark violet-blue, they are said to be Gram-positive. If they are decolorized, they take the counter-stain and are said to be Gram-negative. Many bacteria stain this way and many do not so that often important bacteria may be differentiated in this manner.



66. *Describe the Ziehl-Neelson stain.* The Ziehl-Neelson stain is used to bring out the "acid-fast" characteristics of certain bacteria, particularly the bacillus tuberculosis. This means that the bacteria have such a strong affinity for carbol-fuchsin, that they will not be decolorized after having been stained with it, even on the application of acid. The technic follows: the smear is covered with a filtered solution of carbol-fuchsin and held over a flame so that the liquid will steam but not boil. This is done for five or ten minutes, replacing the stain lost by evaporation, drop by drop. The slide is then alternately immersed in 25 per cent. sulphuric acid and water, until no more color appears after the last washing in the water. It is then counter-stained with Loeffler's methylene blue for one or two minutes and again washed in water and dried. Upon examination, the bacteria will appear red and the surrounding material will be blue.
67. *Mention the commoner pus-producing bacteria.* The commoner pyogenic or pus-producing bacteria are: (a) staphylococcus pyogenes aureus, (b) staphylococcus pyogenes albus, (c) staphylococcus pyogenes citreus, (d) streptococcus pyogenes, (e) gonococcus.
68. *Describe the staphylococci pyogenes.* The staphylococci pyogenes aureus, albus, and citreus are alike except that they produce different colors of pus. Collectively they are called the staphylococci, or grape cocci. They are round and grow in bunches like grapes. They are non-motile and have no flagella or spores. They grow well in oxygen and poorly without it, and thrive best at body temperature.
69. *What is the habitat of the staphylococci pyogenes?* They are widely distributed, found in dirty water, sewage, air, dust of streets and houses, and on the skin. They are normally present in the mouth, nose, rectum, external ear, etc.
70. *What is meant by the term "pathogenesis"?* By the term pathogenesis is meant the various diseases that result from a micro-organism.
71. *What is the pathogenesis of the staphylococci pyogenes?* They cause carbuncles, boils, acne, abscesses, osteomyelitis, septicemia, and any inflammation of the serous membrane. Endocarditis is one of the grave affections caused by these bacteria. They also play an important part in secondary infection, causing necrosis of previously infected tissues.
72. *Describe the streptococcus pyogenes.* The streptococcus pyogenes grows in chains, 4 to 40 individual cocci in a chain. The cocci are not motile and do not have spores. They are Gram positive. They grow either in oxygen or in its absence and are classified as facultative aerobes. They develop best at body temperature.
73. *What is the habitat of streptococcus pyogenes?* They are found in sewage, dwellings, dust, on the healthy human body, and in the cavities of the respiratory tract, rectum, etc.



74. *What is the pathogenesis of streptococcus pyogenes?* This bacterium causes many diseases such as erysipelas, puerperal fever, meningitis, pneumonia, endocarditis, peritonitis, tonsillitis, osteomyelitis, and the diarrhea of children. In general septicemia it is found in the blood and plays an important part in secondary infection, aggravating the original infection and often causing death. Thus, in scarlatina, smallpox, and diphtheria it is often the cause of death.
75. *Describe the gonococcus.* The gonococcus is always found in pairs, and resemble two coffee beans facing each other, and are cemented by an invisible substance. It is non-motile, has no flagella or spores, and stains readily with Loeffler's methylene blue. It is Gram negative. It is facultative anaerobe and grows best at body temperature.
76. *What is the habitat of the gonococcus?* The gonococcus is a strict parasite and is never found outside the human organism except on linen, towels, instruments, etc.
77. *What is the pathogenesis of the gonococcus?* The gonococcus produces a distressing disease called gonorrhea which may become so severe as to cause death. It frequently affects the conjunctiva of the eye and sometimes causes a pan-ophthalmia, which destroys the sight. It may cause arthritis, gonorrheal rheumatism, endocarditis, etc. Any serous membrane may be infected and serious results follow.
78. *Do all bacteria produce disease?* No. Those that produce disease are called pathogenic and those that do not produce disease are called non-pathogenic.
79. *Do all pathogenic bacteria cause pus formation?* No. Those that cause the formation of pus are called pyogenic bacteria, while those that do not form pus are called non-pyogenic bacteria.
80. *Mention some of the non-pyogenic bacteria.* Some of the non-pyogenic bacteria that cause disease are the tubercle bacillus, the anthrax bacillus, and the typhoid bacillus.
81. *Describe the tubercle bacillus.* The tubercle bacillus appears as a slender rod, without spores and flagella. It is a difficult bacterium to stain and requires the Ziehl-Neelson stain. It thrives best at body temperature, grows slowly, and is an obligate aerobe. It dies quickly in sunlight, but in sputum it resists drying and light for months. It is killed quickly by formalin and bichloride of mercury, but resists a 3 per cent. solution of phenol for hours.
82. *What is the habitat of the tubercle bacillus?* The tubercle bacillus is a strict parasite and never lives on dead material. It is widely distributed, being found in all human communities, especially where quarters are crowded. It is found in the dust of rooms, vehicles, and streets and often in milk and butter.
83. *What is the pathogenesis of the tubercle bacillus?* The tubercle

bacillus causes in man and cattle the disease called tuberculosis or consumption. The disease is widespread, but is most common where human beings are huddled together in dark, poorly ventilated shops and rooms. All the tissues of the body may become infected, particularly the lungs, intestines, larynx, spleen, and bones. If the bacilli reach the blood stream they usually produce the acute miliary type of tuberculosis. The lesion of tuberculosis is the tubercle which is a globular mass about the size of a small shot.

84. *Describe the anthrax bacillus.* The anthrax bacillus appears as a large rod often seen in chains or pairs. They have no flagella and are not motile, but they form spores. It is Gram positive. It is a facultative anerobe, but grows much better in oxygen. It grows best at body temperature and the spores withstand great heat for a long period of time.
85. *What is the habitat of the anthrax bacillus?* The anthrax bacillus is found only where infected animals, hides, and hair have been. Hay, bristles, hides, manure, etc., contain the bacilli. Meadows and fields may be contaminated for years. Drinking water may be polluted by tanneries and the bodies of dead animals.
86. *What is the pathogenesis of anthrax bacillus?* It is a very virulent bacterium and grows so rapidly and luxuriantly that it is supposed to cause death by merely mechanically overwhelming the body. The disease is called by different names such as anthrax, splenic fever, woolsorter's disease, malignant pustule, and charbon. The disease has been contracted from shaving brushes in which the bristles were not sufficiently sterilized. In man it is generally fatal, appearing first as a small carbuncle or pustule and soon becoming a general infection.
87. *Describe the typhoid bacillus.* The typhoid bacillus appears as a short plump rod which has flagella and is actively motile, but does not form spores. It stains with all of the common dyes and is Gram negative. It remains alive in ice for months, but grows best at body temperature.
88. *What is the habitat of the typhoid bacillus?* The typhoid bacillus never exists in nature, except where water or soil has been contaminated by feces or urine. It may multiply in potable waters, in milk, and in the juice of oysters. It enters the body through the alimentary tract in food and water. Personal contact is also a method of transmission.
89. *What is the pathogenesis of the typhoid bacillus?* The typhoid bacillus is the cause of typhoid fever. During the attack the germs are found circulating in the blood stream. They are found in the feces even after clinical recovery and are often found in the urine. Typhoid fever is not merely a localized infection, but is a bacteriemia. In some cases there is a mixed infection in which the streptococcus pyogenes plays an important role.

90. *What microorganism causes syphilis?* The organism that causes syphilis is called the *treponema pallidum* of Schaudinn, or the *spirochaeta pallida*.
91. *Describe the spirochaeta pallida.* The *spirochaeta pallida* is a delicate structure which is classified variously, but usually with the spirilla. It has from 3 to 12 turns or bends and its ends are delicately pointed. It is stained with difficulty, the Giemsa stain being best.
92. *What is the habitat of the spirochaeta pallida?* The *spirochaeta pallida* is a strict parasite and is found only in the tissues of those suffering with syphilis. It is not found in the tissues of normal persons or of those suffering with other diseases such as tuberculosis, carcinoma, etc.
93. *What is the pathogenesis of the spirochaeta pallida?* This organism, as before stated, is the cause of syphilis, and is found in chancre and mucous patches in the early stages of syphilis. It is also found in the blood, bone marrow, liver, etc., and in the brain and spinal cord of those suffering with *tabes dorsalis* or locomotor ataxia.
94. *What is the Wasserman test?* The Wasserman test, or the Wasserman reaction, is a test to determine the presence of the syphilitic anti-body in the blood serum of syphilitics.
95. *Briefly describe the Wasserman reaction.* The Wasserman reaction is a very complicated test, the basis of which is the determination of syphilitic anti-bodies in the blood serum of a suspected syphilitic. The test hinges on the hemolysis or solution of the red blood cells of the sheep due to certain changes which have taken place in the serum of the suspect. When hemolysis occurs, the reaction is said to be negative; when it does not occur, the reaction is said to be positive.
96. *Of what value is the Wasserman reaction in the diagnosis of syphilis?* When a positive Wasserman is obtained and the test is known to have been made accurately, it is an absolute sign of syphilis. When the reaction is negative, it does not necessarily preclude syphilis.
97. *Why is knowledge of bacteriology essential to the practice of chiropody?* The practice of chiropody includes the treatment of various infections, and the characteristics of the bacteria causing them should be understood. Further, there are many foot conditions which are merely signs of an infection in some part of the body far remote from the foot, and a knowledge of this subject is necessary to comprehend these infections.

## CHAPTER V.

# PATHOLOGY

1. *Define pathology.* Pathology is that branch of science which deals with diseases in all its relations, especially with its nature and the functional and material changes caused by it. The study of pathology is divided into (a) physiologic pathology, (b) morphologic pathology.
2. *Define physiologic pathology.* Physiologic pathology is that branch of pathology that deals with the changes in function of a part in disease.
3. *Define morphologic pathology.* Morphologic pathology is that branch of pathology that deals with the changes in structure of a part in disease.
4. *What unit is used for pathologic study?* The cell is the unit that is generally used for pathologic study.
5. *What is a typical cell?* A typical cell is an imaginary structure used to simplify study and has all of the characteristics of the various cells in the body.
6. *How do cells functionate?* Cells functionate by vibration within the cells which causes heat and energy.
7. *How are cells destroyed?* Cells are destroyed by infiltration or by degeneration.
8. *What is meant by infiltration?* Infiltration means the entrance of a foreign substance into the cell causing its destruction and is a physical change.
9. *Mention some substances which enter a cell by infiltration.* Some of the substances which enter cells by infiltration are fat, urine, bile, glycogen, the blood plasma, calcium salts, etc.
10. *What is meant by degeneration?* Degeneration is a retrogressive change within the cell in which the living material is converted into inert matter and is a chemical change.
11. *Mention several types of degeneration.* Some of the types of degeneration are fatty, mucoid, colloid, amyloid, cloudy swelling, etc.
12. *Mention one of the common causes of degeneration.* One of the common causes of degeneration is the presence of toxins.

13. *What are toxins?* Toxins are the poisonous products produced by bacteria.
14. *How are toxins classified?* Toxins are classified as (a) endotoxins, (b) exotoxins.
15. *What are endotoxins?* Endotoxins are poisonous substances liberated from the bacterium after its destruction.
16. *What are exotoxins?* Exotoxins are poisonous substances which are set free by living bacteria.
17. *What is atrophy?* The term atrophy is used to designate a decrease from the normal size of a cell. It is classified as single atrophy or as numeral atrophy.
18. *What is single atrophy?* Single atrophy is a decrease in the size of the cells of a tissue.
19. *What is numeral atrophy?* Numeral atrophy is a decrease in the size and reduction of the number of cells of a tissue. This is also called hypoplasia.
20. *What is hypertrophy?* The term hypertrophy is used to designate an abnormal increase in the size or the number of cells of a part.
21. *What is hyperplasia?* The term hyperplasia is used to designate an abnormal increase in the number of cells in a part.
22. *What is pigmentation?* Pigmentation is the accumulation of coloring matter in the tissues between the cells.
23. *What elements are usually found in pigment?* The elements usually found in pigment are carbon, hydrogen, nitrogen, sulphur, and occasionally iron.
24. *Mention two normal pigments found in the body.* The normal pigment of the skin is called melanin and the normal pigment of the blood is called hemotin.
25. *What is the origin of pigment?* The origin of pigment is (a) external, such as tatooing with aniline dyes; (b) internal, due to disintegration of red blood cells.
26. *What is meant by the term "hematogenous pigmentation"?* Hematogenous pigmentation is that which is due to the setting free of pigment by the blood, due to abnormal conditions.
27. *What pigments are released by hematogenous pigmentation?* The two pigments released by hematogenous pigmentation are hemosiderin and hemotoidin.
28. *What is hepatogenous pigmentation?* Hepatogenous pigmentation is the discoloration of the tissues due to the liberation of bile from the liver.
29. *Mention the elements of bile pigment?* The elements of bile pigment are bilirubin or red bile and biliverdin or green bile.

30. *What is lymph?* Lymph is a fluid found in the lymph spaces and lymph vessels and is diluted plasma.
31. *What is an exudate?* An exudate consists of lymph which has passed through the walls of a blood vessel as a result of an inflammatory condition.
32. *What is a transudate?* A transudate consists of lymph which has passed through the walls of a blood vessel as a result of other than inflammatory conditions.
33. *What is the composition of blood?* Blood is composed of plasma, red and white cells, and blood platelets.
34. *What disease-resisting ferment is found in blood plasma?* A substance called hormones is found in the blood which resists disease.
35. *What is plasma?* Plasma is a clear, straw-colored, transparent fluid of alkaline reaction containing several proteins, the most important of which is fibrinogen. Its specific gravity is 1.025 and is 90 per cent. water.
36. *What is a red blood corpuscle?* A red blood corpuscle or an erythrocyte is a small, circular, non-nucleated, bi-concave disk which appears straw-colored singly and red in masses. There are 5,000,000 red blood cells to the cubic millimeter of blood in the male. The red blood cells originate in the red marrow of long bones.
37. *What is a white corpuscle?* A white corpuscle or leukocyte is a round or globular, grayish cell presenting a more or less irregular surface. There are several varieties of white blood cells found in the blood, which are called large mononuclear, small mononuclear, polymorphonuclear. There are also a small percentage of miscellaneous white cells known as eosinophiles, basophiles, neutrophiles, and mast cells. There are about 7,500 leukocytes to the cubic millimeter of blood. They originate in the lymph glands and also in the bone marrow.
38. *What are blood platelets?* Blood platelets, or thrombocytes, are small, circular, shiny disks which are granular and non-nucleated. They are not easily seen under the microscope unless the specimen is specially stained. They are supposed to be the fragments of the cytoplasm of giant cells found in the marrow of bones. They number between 250,000 and 300,000 per cubic millimeter of blood.
39. *What is phagocytosis?* Phagocytosis is a phenomenon by which the white blood cells or leukocytes ingest or digest bacteria or other foreign substances.
40. *What is inflammation?* Inflammation is a succession of changes that occur in a living tissue while it is impaired, provided that the injury is not sufficiently severe to destroy at once the structure and vitality of the tissue. It is a resisting and a defensive process.



41. *What are the causes of inflammation?* The causes of inflammation are: (a) physical, caused by violence; (b) chemical, caused by acids, etc.; (c) thermal, caused by heat and cold; (d) electrical, caused by electricity; (e) bacterial, caused by bacteria or their toxins.
42. *What are the phenomena of inflammation?* During the course of an inflammatory reaction, the phenomena in order are: (1) dilatation of the blood vessels, generally preceded by an initial shock or contraction of the arterioles and an acceleration of the blood stream; this causes a local hyperemia or redness; (2) retardation, a period in which the blood stream slows up and the part has become hot; (3) active migration of leukocytes into the surrounding tissues, called chemotaxis, and is the essential feature of inflammation; (4) synchronous with the emigration of the leukocytes, there is an exudation of lymph, known as the inflammatory exudate, which passes into the surrounding tissues in large quantities; (5) the red blood cells are squeezed through the vessel walls involuntarily, this is called diapedesis; (6) a point of stasis or stagnation is now reached in which the part is red, swollen, hot, painful, and has lost or impaired function.
43. *What occurs in the tissues that surround an inflamed area?* The connective tissue cells immediately surrounding an inflammatory area proliferate or increase in number.
44. *What occurs in an inflamed area after infiltration has taken place?* After infiltration of the inflamed part there is a degeneration.
45. *What are the terminations of inflammation?* The terminations of inflammation are: (1) resolution, (2) organization, (3) suppuration, (4) ulceration, (5) gangrene, (6) chronicity.
46. *What is resolution?* Resolution is that termination of inflammation in which the condition reaches the point of almost complete stasis; the point at which the red blood cells are about to leave the vessel wall (diapedesis), when there is a gradual return to normal.
47. *What is organization?* Organization is that termination of inflammation which reaches a stage of stasis, more tissue being affected, phagocytosis existing together with a proliferation of cells which results in organized scar tissue.
48. *What is suppuration?* Suppuration is that termination of inflammation in which part of the affected tissue has been destroyed, pus being formed.
49. *What is ulceration?* Ulceration is the progressive loss of tissues microscopically, in skin or mucous membrane, which previously has been the seat of an inflammatory process.
50. *What is gangrene?* Gangrene is the terminal stage of inflammation in which there is a death of tissues in large masses.
51. *What is meant by chronic inflammation?* Chronic inflammation



means a long continuance of some or all of the changes seen in acute inflammation, but less in intensity. There is an abnormal tendency to the production of new tissue in chronic inflammation.

52. *What are the cardinal symptoms of inflammation?* The cardinal symptoms of inflammation are pain, heat, redness, swelling, and impaired function.
53. *What are the types of exudates?* The types of exudates are as follows: (a) serous, (b) sero-fibrous, (c) fibrinous, (d) hemorrhagic, (e) purulent or suppurative.
54. *What happens to the exudate in an inflamed area?* The exudate present in an inflamed area is encapsulated by body resistance, thus localizing the process.
55. *What happens if body resistance is below normal and the exudate cannot be encapsulated?* If body resistance is below normal, the inflammation might terminate in a general septicemia or in the formation of metastatic abscesses; this provided there is no encapsulation.
56. *Explain the formation of a capsule in an inflamed area.* Assuming the irritant to be bacteria which have entered the tissues and released their toxins, the following phenomena occur: the initial contraction of the arterioles is followed by an acceleration of the blood stream with consequent enlargement of the blood vessels. The endothelial cells, which line these blood vessels, enlarge and form sister cells or fibroblasts which are released as phagocytic agents. The spaces between the cells of the blood vessels called stomata, having become sufficiently large, permit the exit of leukocytes, fibroblasts, lymph, and red cells into the surrounding tissue. The bacteria, surrounded by their toxins, are now encircled by the leukocytes, lymph, and red cells in the order named, with an occasional fibroblast interspersed among them. The leukocytes are partially destroyed by the toxins, but a liquefaction of dead tissue and a dilution of toxins takes place as a result. The lymph neutralizes and dilutes the toxins while the fibroblasts act as phagocytes, thus completing the work of the leukocytes. The entire infected area undergoes a necrosis. The arrangement of the blood contents around the bacteria, together with the adjacent white fibrous tissue, assumes the formation of organized white fibrous tissue, encapsulating the necrosed tissue, which is now called pus, forming an abscess.
57. *What is the classification of ulcers?* Ulcers are classified as (a) specific, (b) malignant.
58. *What is a specific ulcer?* A specific ulcer is one that is caused by a specific microorganism and is inflammatory in origin.
59. *What is a malignant ulcer?* A malignant ulcer is one that is not primarily of inflammatory origin and which is necrotic in nature. An example is perforating ulcer of the foot in tabes dorsalis which is primarily necrotic. The necrotic tissues act as irritants and cause true inflammatory ulceration secondarily.

60. *Mention three chronic ulcers.* Three chronic ulcers often seen by the chiropodist are (a) irritable, (b) varicose, (c) callous or indolent.
61. *What is necrosis?* Necrosis is the death of more or less extensive groups of cells with degenerative changes in the intercellular substance. It is a term often applied to bone, when this tissue dies en masse without loss of structure.
62. *What is caries?* Caries is the molecular disintegration or ulceration of bone.
63. *Give the clinical classification of gangrene.* The clinical classification of gangrene is (1) dry, (2) moist.
64. *Give the etiologic classification of gangrene.* The etiologic classification of gangrene is (1) direct, (2) indirect, (3) specific.
65. *How does dry gangrene occur?* Dry gangrene occurs as a result of a gradual cutting off of the arterial supply to a part, the fluids in the tissues being drained off by the veins.
66. *How does moist gangrene occur?* Moist gangrene occurs when the venous return is suddenly and completely cut off and the fluids in the tissues remain. All gangrene caused by severe inflammations is of the moist variety.
67. *What is the appearance of a part when it becomes gangrenous?* A gangrenous area suffers a loss of motion, heat, color, and sensation. There is no pulsation. In moist gangrene the part appears purplish and in dry gangrene it appears waxy.
68. *Which form of gangrene is more likely to be septic.* The moist form of gangrene is more likely to be septic. This is due to the presence of fluids in the tissues in this form.
69. *What objective symptom readily distinguishes moist gangrene from dry gangrene?* Moist gangrene has a very offensive odor. Dry gangrene causes the affected parts to assume a shriveled, parchment-like appearance.
70. *What is a slough?* A slough is necrosed or dead tissue which is separated from the living tissue by a process of inflammation, the dead material being forced off by the formation of granulations beneath.
71. *What is the line of demarcation?* The line of demarcation is an inflammatory line which distinctly separates living from dead tissue and precedes the formation of a line of separation.
72. *What is the line of separation?* The line of separation is a more or less indistinct, irregular line which separates living from dead tissue, and is caused by the formation of granulation tissue.
73. *What is the difference in the lines of demarcation and separation in dry and moist gangrene?* In moist gangrene, the lines are well developed whereas in dry gangrene they are usually imperfectly developed.

74. *How is the dead tissue cast off?* The dead tissue is cast off by a process known as ulcerative inflammation, in which the granulations that form in the living tissue lift off the slough. A certain amount of pus is formed by the granulations at the line of demarcation.
75. *What is a tumor?* The term tumor is used to indicate any swelling, but in a restricted sense, it is applied to designate a new growth or neoplasm.
76. *How are tumors classified?* Tumors are classified as to their character as (a) benign, (b) malignant. They are also classified according to their consistency as (a) solid, (b) cystic.
77. *What are benign tumors?* Benign, or innocent tumors, are those growths which do not cause death directly, and which when removed do not recur. Examples are fibroma, osteoma, etc.
78. *What are malignant tumors?* Malignant tumors, or cancers, are those growths which cause death and which will recur when removed. Examples are epithelioma, sarcoma, etc.
79. *What are solid tumors?* Solid tumors are those which are made up of solid tissue such as muscle (myoma), bone (osteoma), etc.
80. *What are cystic tumors?* Cystic tumors are those which are made up of a more or less defined wall and containing a liquid or semi-liquid substance. Examples are sebaceous cyst, retention cyst, etc.
81. *Mention some of the characteristic differences between innocent and malignant tumors.* The innocent tumors are growths of normal tissue and are composed of the tissues in which they are found. Malignant tumors are growths of perverted tissue and are not made up of the tissues in which they are found. The innocent tumors do not cause death, except indirectly, while the malignant tumors do cause death. The innocent tumors are encapsulated while the malignant growths are not and spread into the surrounding tissues. An innocent tumor, when excised, does not recur. A malignant tumor will recur after excision unless the operation is very extensive and is done early in the development of the growth.

## CHAPTER VI.

# PHYSICAL DIAGNOSIS

1. *What is the study of physical diagnosis?* Physical diagnosis is that branch of medicine which aims to aid in making a diagnosis by objective, subjective, mechanical, or physical means.
2. *What comprises physical diagnosis?* Physical diagnosis comprises the use of the clinical thermometer, subjective and objective examination, history taking, palpation, percussion, auscultation, and mensuration.
3. *What is the function of the clinical thermometer?* The clinical thermometer is used to measure the temperature of the body, either subnormal, normal, or abnormal.
4. *What is the normal temperature of the body?* The normal temperature of the body at the surface is 98.6 degrees Fahrenheit, or 37 degrees Centigrade.
5. *What does a subnormal temperature indicate?* A subnormal temperature usually signifies a lowered degree of health and vitality and indicates an apathetic state. When it occurs suddenly it indicates hemorrhage or shock.
6. *What does an abnormal temperature indicate?* An abnormal temperature usually indicates infection and inflammation.
7. *What is subjective examination?* Subjective examination is the information elicited from the patient by means of questions and answers.
8. *What is objective examination?* Objective examination is what we can see, particularly that which pertains to the departure from the normal.
9. *Of what importance is history taking?* History taking is of value for future reference and facilitates remembering all symptoms, diagnoses, and treatment of a particular case.
10. *What is palpation?* Palpation is the use of the sense of touch in examining the body and is used for feeling abnormalities, etc.
11. *What is percussion?* Percussion is the eliciting of sounds by tapping with the fingers, noting any departure from the normal sound.
12. *What is auscultation?* Auscultation is listening with the ear di-

rectly to the part ((immediate method) or through the medium of an instrument called the stethoscope (mediate method).

13. *What is mensuration?* Mensuration is measuring parts of the body and is useful in making comparisons.
14. *What are the cardinal symptoms of infection and inflammation?* The cardinal symptoms of infection and inflammation are pain, heat, redness, swelling, and partial loss of function.
15. *Mention three infections met occasionally in chiropody.* Three such infections are staphylococcal infection, streptococcal infection, and erysipelas.
16. *Does the temperature of the body rise with these infections?* The temperature seldom rises in staphylococcal infection and practically always in streptococcal infection and erysipelas.
17. *Differentiate chilliness and chill.* Chilliness is simply a feeling of localized cold, such as chilliness down the spine. True chill is characterized by shaking of the body and chattering of the teeth and an intense feeling of cold over the entire body.
18. *What is the significance of a chill?* A chill signifies a rapid rise in body temperature due to infection and absorption of toxins.
19. *What is the significance of night sweats?* Night sweats usually signify a vitality of the system below normal, usually due to infection as tuberculosis, pneumonia, and anemia.
20. *What should be suspected if a patient complains of gaining a pound a day?* General oedema, or excessive fluid in the tissues, should be suspected.
21. *What are the causes of general oedema?* The causes of oedema are nephritis and heart decompensation (weak heart muscle).
22. *How can these two causes of oedema be differentiated?* The oedema of nephritis is usually all over the body. The oedema of cardiac decompensation usually begins in the feet and legs and extends upward.
23. *How can oedema be diagnosed?* Oedema can be diagnosed by pressing directly over a bone as the tibia or forehead. This pressure will produce pitting, showing the presence of fluid in the tissues.
24. *Of what significance is the recognition of oedema to the chiropodist?* In oedema all operative treatment is contraindicated on account of the risk of infection, tissue resistance being below normal, making healing slow or doubtful, with the possibility of sloughing.
25. *What does cyanosis (blueness) of the lips, ears, cheeks, nose, and finger nails indicate?* This symptom appears in any condition in which the blood is not properly oxygenated such as pneumonia, asthma, cardiac disease, and poisoning by coal-tar derivatives such as headache powders, aspirin, etc.

26. *What is the significance of cyanosis to the chiropodist?* The feet will be affected as well as the other parts of the body and will feel cold to the touch. In such cases operative procedures are contra-indicated.
27. *What subjective symptom would lead one to suspect myocarditis (degeneration of the heart muscle or weak heart)?* The characteristic symptom of myocarditis is dyspnea (shortness of breath) on exertion or walking up hill, up stairs, dancing, running, etc.
28. *What objective symptom would lead one to suspect myocarditis?* The characteristic symptom is oedema of the feet and legs with pitting on pressure as at the shoe tops.
29. *What other constitutional or systemic conditions cause pitting?* Kidney disease, varicose veins, tight garters, increased abdominal pressure on return veins as in pregnancy, tumors, cirrhosis (hardening of the liver) will cause pitting.
30. *How can such conditions be differentiated?* In heart conditions the oedema is limited to the feet and legs only or it is worse in these regions than elsewhere and there is dyspnea on exertion. In kidney conditions the oedema is general and is found in the face, arms, chest, abdomen, and lower extremities. Examination of the urine also determines kidney disease. Varicose veins can be seen upon examination as enlarged, superficial, tortuous veins. The other factors in oedema can be determined by a history of the case.
31. *What is angina pectoris?* Angina pectoris is a spasm of the coronary arteries of the heart causing a cramp of the myocardium.
32. *What are the symptoms of angina pectoris?* The symptoms are a sudden knife-like pain over the region of the heart, usually reflecting down the left arm. The pain is of sudden onset and usually attacks those with high blood pressure and arteriosclerosis.
33. *Of what interest is angina pectoris to the chiropodist?* This condition may result from the use of cocaine or adrenalin in local anesthesia in an operation.
34. *What is the danger of angina pectoris?* The danger is sudden death following the pain.
35. *What is the treatment to be given during such an attack?* Nitro-glycerin tablets, 1/100 of a grain placed under the tongue and repeated every ten minutes until relieved.
36. *What would lead one to suspect high blood pressure?* High blood pressure should be suspected in individuals who have tortuous temporal vessels, arcus senilis (a grayish ring at the edge of the cornea of the eye), vertigo (dizziness), throbbing in the ears, and insomnia.
37. *How can a positive diagnosis of high blood pressure be made?* A positive diagnosis of high blood pressure can be made by the



sphygmomanometer or blood-pressure apparatus.

38. *Of what interest is the diagnosis of high blood pressure to the chiropodist?* In hypertension, tissue resistance is below par. Operations are a greater risk than in normal persons. Antisepsis should be more complete. In middle-age persons, syphilis or nephritis should be suspected.
39. *What is the pulse?* The pulse is a rhythmically recurring impulse arising in the systole (contraction) of the left ventricle of the heart and palpable throughout the arterial system.
40. *Where can the pulse best be felt?* The pulse can be best felt at the wrist above the base of the thumb (radial artery), in front of the ear (temporal artery), about an inch forward from the angle of the jaw (facial artery), on the dorsum of the foot immediately to the outside of the tendon of the extensor longus hallucis (dorsalis pedis artery), on the inner side of the foot behind and a little below the inner malleolus (posterior tibial artery).
41. *What is the rate of the normal heart beat?* The normal heart beats 70 to 75 per minute in the male and 75 to 80 per minute in the female in a standing position; this is 5 to 10 beats per minute less lying down.
42. *Mention three causes of increased heart rate.* Three causes for increased heart rate are fever, goiter, and excitement.
43. *What is meant by blood pressure?* Blood pressure is the lateral tension on the vessel wall exerted by the blood while flowing through the arteries.
44. *What is hypertension?* Hypertension is increased blood pressure.
45. *Mention six causes of hypertension.* Six causes of hypertension are worry, anxiety, overwork, lack of sleep, nephritis, and syphilis.
46. *What constitutional condition does high blood pressure cause?* High blood pressure causes premature senility.
47. *How does high blood pressure interest the chiropodist?* It must be remembered that the feet share in the aging process taking place in the body and that their vitality and tone are lowered in proportion.
48. *What is the danger of high blood pressure?* High blood pressure may bring about cerebral hemorrhage, or apoplexy, causing paralysis or death.
49. *What is a constitutional disease?* A constitutional disease is a chronic ailment affecting the entire body, lowering its resistance, and reducing vitality.
50. *Mention two constitutional diseases.* Two constitutional diseases are syphilis and diabetes.
51. *What is the etiology of syphilis?* Syphilis is caused by a micro-organism called the spirochaeta pallida.

52. *Describe the usual clinical course and symptoms of syphilis.* (Primary stage): The chancre or initial lesion occurs at the site of infection, the average incubation time being about twenty-one days. (Secondary stage): There is a generalized eruption of a copper-colored skin rash which does not itch, sore throat, temporary falling of the hair, fever, and general malaise. It appears from one to three months after the primary sore. (Tertiary stage): A gumma (syphilitic tumor) may appear in any part of the body, attacking any tissue, and manifests itself any time after one year after infection. Syphilis in its tertiary stage may simulate almost any disease, and particularly affects the nervous system. It is contagious throughout its entire course by contact or through secretions, discharges, or blood.
53. *What are the essentials to be remembered in operating on a patient having syphilis?* There is a grave danger of infecting the operator and also of infecting other patients if instruments are not properly sterilized. In the tertiary stage, tissue resistance is below normal, healing is poor, and operative infection is more liable to occur.
54. *Give the usual symptoms of diabetes?* The three cardinal symptoms of diabetes are polydipsia (increased thirst), polyphagia (increased appetite), and polyuria (increased amount of urine). There are two kinds of diabetes: (1) True diabetes, or diabetes mellitus, in which the urine contains sugar and is of high specific gravity; (2) diabetes insipidus, in which the urine does not contain sugar and is of low specific gravity. The first form only affects the general health.
55. *What condition might follow a slight operation especially upon the feet of diabetic patients?* Slight operations upon the feet of diabetics may terminate in gangrene with loss of the toe or the foot.
56. *How does tuberculosis affect the feet?* Tuberculosis may cause tubercular necrosis or arthritis of the bones.
57. *What might be suspected in an individual who gradually lost weight without obvious reason?* Pulmonary tuberculosis might be suspected.
58. *What are the symptoms of pulmonary tuberculosis?* The symptoms of pulmonary tuberculosis are gradual loss of weight, a rise in body temperature in the evening, cough, ease of fatigue, and night sweats.
59. *What peculiar abnormality of the head might lead one to suspect syphilis?* Syphilis might be suspected in individuals who have an unusually large head (macrocephalus) or an unusually small head (microcephalus).
60. *What two characteristic conditions of the hair would lead one to suspect syphilis?* Syphilis might be suspected where the hair

falls out rapidly and is replaced after a short duration, or where the hair falls out in circumscribed areas causing complete baldness in these areas. The latter condition is called alopecia areata.

61. *What diagnosis would be made if a patient fell in the office in convulsions (jerking of the upper and lower extremities and jaw)?* Such a condition would be diagnosed as epilepsy.
62. *What is meant by the Argyll-Robertson pupil?* If the eyelids are closed and then are quickly opened by the examiner, the pupils contract sluggishly or not at all when exposed to the light.
63. *What is the significance of the Argyll-Robertson pupil?* Such a pupil indicates tertiary syphilis and beginning tabes.
64. *What is tabes?* Tabes or tabes dorsalis (locomotor ataxia) is a degenerative condition of the posterior columns of the spinal cord due to syphilis.
65. *Why should the chiropodist be able to recognize tabes?* Such patients often come to the chiropodist complaining of a sore on the plantar surface of the foot called perforating ulcer, with a complaint of weakness, numbness of feet, and pains in the legs.
66. *Describe arcus senilis.* Arcus senilis is a fatty, grayish ring found in the cornea at the periphery of the iris, often noticed in elderly people, and is due to a degeneration and fatty deposits.
67. *What is the significance of arcus senilis?* Its significance is arteriosclerosis, usually with high blood pressure. When seen in middle-aged people it suggests premature aging of the patient.
68. *What is the significance of arcus senilis to the chiropodist?* In such cases the general health is below normal and the feet are also below normal.
69. *What condition is suggested by spontaneous recurrent nose bleed in an elderly person?* Such a condition would suggest hypertension, or arteriosclerosis.
70. *Should such a nose bleed be stopped?* No, as the loss of blood reduces blood pressure and prevents cerebral hemorrhage.
71. *What is meant by hemophilia?* Hemophilia is the inability of the blood to coagulate to a greater or lesser extent.
72. *What are the dangers of hemophilia?* Persons suffering with this condition can have serious hemorrhages from the slightest cut or wound.
73. *What condition would a chronic, raised, crusty sore or ulcer of years' duration at the nasal side of the orbit suggest?* Such a lesion would suggest cancer (epithelioma) of the skin.
74. *Mention the five most prominent signs or stigmata of degeneracy.* The five most prominent signs of degeneracy are abnormally tall or short stature, abnormally large or small head, absence of the lobe of the ear (the lower part of the ear is attached directly to

the head), high arched palate, and an unusually small palpebral fissure (the opening between the margins of the eyelids).

75. *Mention and describe three kinds of degenerates.* (1) Superior degenerates are those who have unusual mental endowments and are usually very artistic. (2) Inferior degenerates are those who show signs of degeneracy, their mentality is below normal, they are erratic, morbid, eccentric, criminal, or insane. (3) Debile are weak minded, imbecile, and idiotic. Those of class 1 aggravate their symptoms and are very sensitive to pain. Those of class 2 minimize their symptoms and endure pain well. Those of class 3 have the mentality of a child and diagnosis must be made by physical examination.
76. *What condition is suggested by paleness of the lips and of the inner surface of the lower eyelids?* Such a state should suggest anemia.
77. *Mention two important lesions of the lips.* Two important lesions of the lips are epithelioma (cancer) and chancre.
78. *How are these lesions differentiated?* Cancer is usually of months or years duration; an increased amount of tissue is often present; there is a glandular enlargement at the side of the neck which comes late; there are no constitutional symptoms until late in the disease; the Wasserman test is negative; no spirochaeta show on the microscopic slide; there is no fever. In chancre there is a history of exposure to syphilis and the ulcer appears about three weeks after such exposure and passes away after four or five weeks; the glands are involved early; there is no increase in tissue; an ulcer appears with a loss of tissue; there are early constitutional symptoms such as headache; fever is present; there is a generalized skin rash which appears about from one to three months after and does not itch; the Wasserman test is usually positive and spirochaeta are found under the microscope.
79. *What two diseases can be strongly suspected from the odor of the breath?* Diabetes with complication and severe kidney disease are often detected by the odor of the breath.
80. *Describe the odor from such a breath.* In diabetes with acidosis the breath has an acetone odor (odor of violets). In severe kidney disease there is an uraemic odor, the breath smelling of urine. There is suppression of urine.
81. *Of what value is this knowledge of the odor of the breath to a chiropodist?* Any operative work in such cases is contraindicated, as tissue resistance and vitality is below normal. Infection and sloughing are liable to occur with grave results.
82. *How does syphilis sometimes manifest itself on the tongue?* There may be a chancre (primary stage) or mucous patches (secondary stage), or there may be a gumma; enlargement of the tongue with deep fissures and indentations of the teeth on borders (tertiary stage).

83. *Does active syphilis contraindicate surgery?* Yes, on account of the resistance being below normal.
84. *Of what use is the study of physical diagnosis to the chiropodist?* As will be noted by the foregoing questions and answers, anyone having to do with any part of the human anatomy, or treating pathologic conditions thereof, should remember that no one part is entirely independent of the balance, and that by encouraging our use of signs and symptoms nature offers us we will make fewer mistakes, in unusual cases, attain better results, and receive fewer criticisms.

## CHAPTER VII.

# DERMATOLOGY AND SYPHILOLOGY

1. *What is dermatology?* Dermatology is that branch of medicine which deals with the diagnosis and treatment of diseases of the skin.
2. *What is syphilology?* Syphilology is that branch of medicine which has to do with syphilis and all its relations.
3. *How are lesions on the skin classified?* Lesions on the skin are classfid as primary and secondary.
4. *What are primary lesions?* The primary lesions are those which constitute the initial manifestations upon the skin.
5. *What are secondary lesions?* Secondary lesions result from the natural or accidental modification of the primary lesions.
6. *Mention the primary lesions.* The primary lesions are macules, papules, vesicles, blebs, pustules, tubercles, wheals, and tumors.
7. *What is a macule?* A macule is a circumscribed discolored (increase or decrease of pigment) patch of skin of variable size and shape, without elevation or depression.
8. *What is a papule?* A papule is a circumscribed solid elevation of the skin varying in size from a pin head to a pea. It may be rounded, pointed, or flat and variously colored.
9. *What is a vesicle?* A vesicle is a pin-head to pea-size circumscribed elevation of the epidermis containing clear or opaque fluid.
10. *What is a bulla?* A bulla is a round or irregularly shaped pea to egg sized elevation of the epidermis containing clear or opaque fluid.
11. *What is a pustule?* A pustule is a circumscribed flat or acuminate elevation of the epidermis containing pus.
12. *What is a wheal?* A wheal is an edematous circumscribed irregular pinkish elevation of the skin, transitory in character.
13. *What is a tubercle?* A tubercle is a circumscribed, solid, deep-seated elevation of the skin attaining or surpassing the size of a pea.



14. *What is a tumor?* A tumor is a variously sized and shaped prominence having its seat in the corium or subcutaneous tissue.
15. *Mention the secondary lesions?* The secondary lesions are scales, crusts, excoriations, fissures, ulcers, scars, and stains.
16. *What are scales?* Scales are dry epidermal exfoliations shed from the surface of the skin.
17. *What are crusts?* Crusts are brownish or yellowish masses of dried exudation.
18. *What are excoriations?* Excoriations are epidermal denudations, usually the result of local traumatism.
19. *What are fissures?* Fissures are linear cracks or wounds in the epidermis or corium due to disease or injury.
20. *What are ulcers?* Ulcers are round or irregular losses of tissue involving the skin and subcutaneous tissue.
21. *What are scars?* Scars are connective tissue new formations occupying the region of former losses of tissue.
22. *What are stains?* Stains are discolorations of the skin left after the disappearance of cutaneous lesions.
23. *Mention the subjective symptoms occurring in skin diseases?* The various subjective phenomena occurring in skin diseases are the sense of heat, burning, itching, smarting, tingling, and pain. These are present in varying degrees of intensity in different diseases.
24. *Describe the embryonic origin of the skin.* The epidermis of the skin is derived from the ectoderm. The derma or corium is derived from the mesoderm.
25. *How are the layers of the skin divided?* The layers of the skin are divided into three distinct sections; the epidermis, the corium and the subcutaneous tissue.
26. *How is the epidermis divided?* The epidermis, cuticle, or scarf skin is divided into four layers: (a) stratum corneum, (b) stratum lucidum, (c) stratum granulosum, (d) stratum mucosum.
27. *Describe the stratum corneum.* The stratum corneum, or horny layer of the epidermis is made up of many layers of non-nucleated, scaly cells which act as a protection to the softer structures below.
28. *Describe the stratum lucidum.* The stratum lucidum, or clear layer is made up of from two to four layers of bright elongated cells which appear clear under the microscope.
29. *Describe the stratum granulosum.* The stratum granulosum or granular layer is made up of several layers of flattened granular cells. The granules contain a chemical substance called keratohyalin and an allied substance called eleidin. These substances play a part in the changes that take place in the character of the skin in the outer layers.

30. *Describe the stratum mucosum.* The stratum mucosum, the mucous layer or rete Malpighii, is the deepest and most important layer of the epidermis. The basal layer rests upon the basement membrane or membrana propria and is made of columnar epithelium. These cells have the power of reproduction and also contain the pigment of the skin. Above the basal layer are several layers of cells which contain nuclei and which have serrated borders. These are called prickle cells.
31. *How is the epidermis nourished?* The epidermis has no blood vessels, but receives nourishment by osmosis from the derma, the nutrient fluid being found in the intercellular spaces in the lower layers.
32. *How is the derma divided?* The derma, corium, or cutis vera is divided into two layers: (a) the papillary layer, (b) the reticular layer.
33. *Describe the papillary layer of the corium.* The papillary layer of the corium or the Pars Papillaris, is made up of bundles of connective tissue fibers in which are found connective tissue cells. The papillae are small conical elevations which dovetail with the rete above. These papillae contain blood vessels, nerves, lymphatics, and nerve corpuscles.
34. *Describe the reticular layer of the corium.* The reticular layer of the corium, or the Pars Reticularis, is made up of loosely arranged bundles of connective tissue fibers. This layer blends with the papillary layer without a line of demarcation. The blood vessel and lymphatic plexuses are found in this structure as well as the hair follicles, sweat glands, and sebaceous glands.
35. *Describe the subcutaneous tissue.* The subcutaneous tissue, stratum subcutaneum or tela subcutanea, is made up of loose connective tissue in the meshes of which are contained the fat globules. The deeper hair follicles and sweat glands are also found here.
36. *Describe the arrangement of the blood vessels in the derma.* The blood vessels are arranged in two plexuses, the superficial, found in the papillary layer and from which the capillary loops enter the papillae, and the deep plexus, which is found in the reticular layer. The deep plexus sends branches to the sweat and sebaceous glands and to the hair follicles.
37. *Describe the arrangement of the lymph vessels in the derma.* The lymph vessels follow the blood vessels in a general way, there being a superficial and a deep lymph-plexus.
38. *Describe the nerve supply to the skin.* The nerves terminate mostly in the derma, the medullated fibers terminating in the papillae as tactile corpuscles and in the subcutaneous tissue as Pacinian corpuscles. The non-medullated fibers penetrate the derma and are lost in the rete of the epidermis. The skin also contains motor and vaso-motor nerves.

39. *How are skin diseases classified?* Skin diseases are classified according to their general characteristics into various groups such as anemias, hyperemias or congestions, inflammations, hypertrophies, atrophies, neoplasms or new growths, etc.
40. *What common skin diseases appear on the foot and leg?* The commoner skin diseases that appear on the foot and leg are erythema nodosum, eczema, impetigo, pompholyx, lichen planus, psoriasis, the various forms of dermatitis, tinea trichophytina, pediculosis, scabies, ichthyosis, elephantiasis, tuberculosis, and syphilis.
41. *What is erythema nodosum?* Erythema nodosum, or dermatitis contusiformis, is an acute inflammatory disease of the skin in which are found round or oval node-like swellings.
42. *What are the symptoms of erythema nodosum?* The symptoms are as follows: fever, articular pains, coated tongue, and general malaise. The round or oval swellings, varying in size from a hazel nut to an egg, appear on the tibia. Sometimes the forearms, face, and trunk are also involved. The nodes are red, tense, and shining and tender to the touch. They are hard at first but soon soften. They never suppurate. It appears in early life, being rare after the age of thirty. Males are affected much oftener than females.
43. *What is the treatment for this condition?* The treatment consists of regulation of the bowels and other internal treatment. Externally hot lead and opium wash and elevation of the legs. Recovery is complete in two to six weeks.
44. *What is eczema?* Eczema, tetter, salt rheum, etc., is an acute, subacute, or chronic, non-contagious disease of the skin characterized primarily by erythema, vesicles, papules, or pustules, and secondarily by scales and crusts and accompanied by itching and burning; a catarrhal dermatitis. This disease constitutes about 30 per cent. of all skin diseases and affects persons at all ages and in all conditions of life. It is the most important of all skin lesions.
45. *How many types of eczema are recognized?* There are four elementary types of eczema: *Eczema erythematosum*, *eczema papulosum*, *eczema vesiculosum*, and *eczema pustulosum*. These may terminate in the more chronic forms, *eczema rubrum* or *eczema squamosum*.
46. *What forms of eczema are usually found on the feet?* The forms of eczema usually found on the feet are *eczema vesiculosum*, *eczema rubrum*, *eczema squamosum*, and *eczema fissum*.
47. *How else is eczema classified?* Eczema is also classified as acute and chronic. This classification applies not only to the duration but also to the intensity of the inflammatory process.
48. *How are these two stages differentiated?* The acute type of

eczema is always accompanied by surface exudation, while the chief characteristic of chronic eczema is infiltration.

49. *What is the etiology of eczema?* The actual cause is unknown. The contributing causes of eczema are both internal and external. The internal causes include disorders of the alimentary tract such as constipation, dyspepsia, etc., functional and organic nerve diseases, general debility, rheumatism, diabetes, Bright's disease, etc. The external causes are many and include chemical irritants, such as acids, strong soaps, etc.; thermal irritants, such as solar or artificial heat, cold when associated with wet; mechanical irritants, such as friction, scratching, etc.
50. *What is the diagnosis of eczema?* The diagnosis of eczema is usually simple, but occasionally becomes difficult. Its cardinal characteristics are redness, vesicles, pustules, and discharge; crusting and scaling; infiltration and thickening; itching and burning.
51. *What is the prognosis of eczema?* Eczema very often runs a long chronic course and if untreated will continue indefinitely. Proper treatment, continued sufficiently, will usually bring good results.
52. *What is the treatment for eczema?* The treatment for eczema is both internal and external. The internal treatment consists of diet, laxatives, digestives, alteratives, etc.
53. *What is the external treatment for eczema?* The local treatment of the lesions is most important and requires a very careful selection of drugs. The type of drug to be used is governed entirely by the degree of inflammatory reaction present. In acute eczema the treatment must be soothing, even water being an irritant to this type. In chronic eczema soaps and water are of value. The basic principle upon which treatment is given is soothing agents for acute cases and stimulants for chronic cases.
54. *What drugs are used in the treatment of acute eczema?* The soothing agents most commonly used in acute eczema are zinc oxide, corn starch, rice flour, bismuth subnitrate, boric acid, kaolin, etc. Olive oil is used to cleanse the skin. Lotions are used in moist eczema, and these may contain zinc oxide, calamine, phenol, boric acid, lime water, glycerine, etc.
55. *What drugs are used in chronic eczema?* The stimulant group of drugs are used in chronic eczema and include tar, white precipitate, sulphur, salicylic acid, etc.
56. *What other local measures are used in the treatment of eczema?* Other measures than drugs include baths, containing starch or borax, and the X-ray.
57. *Describe impetigo.* Impetigo, or impetigo contagiosa, is an acute inflammatory disease of the skin which is contagious. It is characterized by the appearance of vesicles or blebs which become pustular and dry upon the skin as thin crusts. There is a form of impetigo called impetigo simplex which is non-contagious. This

latter form is often seen upon the foot and is caused by the scratching of other itchy skin lesions such as eczema or lichen planus.

58. *What is the treatment for impetigo?* The treatment for impetigo consists of the use of mercurial ointments which are strong antiseptics. The crusts should be removed with soap and water and white precipitate, about 2 per cent., in zinc ointment should be applied. The local remedy should not be irritant as this tends to aggravate the condition.
59. *What is pompholyx?* Pompholyx is an acute inflammatory disease of the skin in which hard, deep-seated vesicles appear upon the hands and feet. Many cases formerly diagnosed as pompholyx have been found to be due to some form of tinea.
60. *What are the symptoms of pompholyx?* The patient complains of a feeling of heat, burning, tingling, or itching. The vesicles may remain separate or they may coalesce to form bullae. The fluid is often absorbed and the eruption will disappear within a few days. Hyperidrosis often accompanies an attack and recurrences are frequent.
61. *What is the cause of pompholyx?* The etiology of pompholyx is given as occurring in those whose nervous tone is below normal. It is commonly associated with increased sweating and is more frequent in women than in men. It is seen mostly in adult life.
62. *What is the treatment of pompholyx?* The treatment of pompholyx is both internal and external. The internal treatment consists of the use of tonics. Locally salicylic acid, boric acid, diachylon ointment, and X-rays are used.
63. *What is lichen planus?* Lichen planus is an inflammatory disease of the skin characterized by the appearance of small, flat, angular, shining, bluish-red papules associated with pronounced itching.
64. *What is the cause of lichen planus?* The cause of lichen planus is probably of neurotic origin. Nervous exhaustion resulting from grief, worry, overwork, etc., is the most common cause. Digestive disturbances are also etiologic factors.
65. *What is the treatment of lichen planus?* The treatment is both general and local. Hygiene and diet must be regulated and arsenic or mercury are given internally. When the intestinal tract is at fault, correction of the trouble will clear up the skin lesion. Locally tar, phenol, salicylic acid, mercury, etc., are used.
66. *What is psoriasis?* Psoriasis is a chronic inflammatory skin disease which is characterized by variously sized, reddish, dry, rounded patches covered with abundant silvery scales.
67. *What are the symptoms of psoriasis?* The disease may attack any one at any age, but adolescents and young adults are the ones usually afflicted. It begins as small reddish papules covered with small scales. These spread at the periphery until they attain



the size of a dollar. The scales look like mother-of-pearl and are superimposed upon each other in an imbricated manner. The lesion is always dry, and appears most often on the extensor surfaces of the elbows and knees. Itching is usually slight.

68. *What is the etiology of psoriasis?* The cause of this disease is obscure. Gout and rheumatism are often associated with psoriasis and are considered by some as etiologic. There are three etiologic views which are metabolic, nervous, and microbic. The first seems to be the most likely.
69. *What is the treatment for psoriasis?* Both internal and external treatment is used. Internally arsenic is used most. Externally the treatment consists of first removing the scales by washing with soap and water. The drugs used are chrysarobin, tar, white precipitate, salicylic acid, etc. The disease is liable to relapses, especially in cold weather.
70. *What is meant by the term "dermatitis"?* Dermatitis, or inflammation of the skin, is a disorder characterized by pain, heat, redness, and swelling. The term is restricted to acute inflammations which result from known irritants.
71. *How is dermatitis classified?* Dermatitis is classified as: (a) dermatitis traumatica, (b) dermatitis calorica, (c) dermatitis venenata, (d) dermatitis medicamentosa, (e) dermatitis gangrenosa.
72. *What is dermatitis traumatica?* Dermatitis traumatica is an inflammation of the skin due to all forms of external violence such as contusions, lacerations, and excoriations (due to friction, scratching, etc.). The dermatitis caused by scratching is of importance, as it often is the means of complicating other skin diseases.
73. *What is dermatitis calorica?* Under this head are included the inflammations caused by heat (dermatitis ambustionis), and by cold (dermatitis congelationis). In both these forms of dermatitis calorica there is erythema, vesication, or gangrene, accompanied by severe pain.
74. *What is dermatitis venenata?* Dermatitis venenata is due to contact with harmful animal and vegetable substances. Under this may be mentioned the acids and alkalies, croton oil, mustard, cantharides, anilin dyes, etc. The most important etiologic factor in dermatitis venenata is poison ivy, or poison oak, and poison sumach or dogwood.
75. *What are the symptoms of dermatitis venenata?* After exposure to the poison of the plant, in from a few hours to a few days, the hands and face become the seat of a large number of vesicles and blebs. The rest of the body often becomes involved by auto-inoculation. The eruption lasts from one to four weeks. Some persons are very susceptible to this poisoning so that close proximity without actual contact will bring about an attack. Others, again, manifest no bad effects even after contact with the poison.



76. *What is the treatment of dermatitis venenata?* The treatment of this lesion consists of the use of local applications, the best of which are alcohol and lead water. Ointments containing phenol and sodium bicarbonate are also used.
77. *Describe dermatitis medicamentosa.* This class of dermatitis (drug eruptions) includes eruptions caused by the ingestion or absorption of certain medications.
78. *What factors favor the appearance of drug eruptions?* The factors that favor the appearance of drug eruptions are idiosyncrasy, excessive cutaneous elimination, imperfect renal or intestinal elimination, large doses, long continued use of the drug. Individual susceptibility is the most important factor.
79. *How does the eruption appear?* The eruption may appear as macular, papular, vesicular, bullous, or hemorrhagic.
80. *Which drugs are most likely to cause dermatitis medicamentosa?* The drugs most likely to cause this disease are antipyrin, arsenic, belladonna, bromides, chloral, copaiba, cubebs, digitalis, iodides, mercury, opium, quinine, salicylic acid, etc.
81. *Which of these drugs is liable to produce an eruption which might be brought to the attention of the chiropodist?* The drugs are bromides and iodides.
82. *What is dermatitis gangrenosa?* Dermatitis gangrenosa is an inflammation of the skin which results in death of the tissues in mass. Any local or systemic condition which may terminate in death of the skin should be classified as dermatitis gangrenosa. Thus, burns or frostbite, which are classified as dermatitis calorica, become dermatitis gangrenosa when there is a death of tissue. So, too, infections like trench foot are thus classified. Systemic disease, such as Raynaud's disease and diabetes, may also cause dermatitis gangrenosa.
83. *What is the treatment of dermatitis gangrenosa?* There are two ways of treating this condition—one active and the other passive. The first consists of excision above the dead tissue and the second of waiting until a line of demarcation has formed and the dead area cast off by a slough.
84. *What is tinea?* Tinea is a parasitic organism of the fungus variety which attacks the skin of man. There are many forms of this parasite, but the two most common and of most interest to the chiropodist are the tinea trichophytin and the tinea epidermiphytin. The disease is called ringworm.
85. *What are the symptoms of ringworm?* The eruption usually affects the skin on the plantar surface of the toe webs, and at first is apt to be mistaken for eczema. It may occur at any age, but very old people are rarely affected. It appears more often in warm weather in which it differs from eczema. The fungi penetrate deeply into the epidermis and undergo periods of dormancy and

growth, alternately. In cold weather the disease is dormant, while in warm weather it becomes active. When the attack recurs the lesions are found in the same place as they occupied formerly.

86. *How many varieties of tinea or ringworm are there?* There are three varieties described. In the first variety there is an overproduction of callous with more or less scaling and fissuring. In the second class there is maceration between the toes, especially the fourth interspace. The eruption spreads along the toes toward their ends, to the dorsal surface or backward on the sole with a spreading vesicular margin. This variety may be so slight as to be scarcely noticeable, with white friable scales, or it may be so severe that it will undermine thick layers of epidermis. When the lesion is so severe it is called "eczematoid ringworm." The third variety is characterized by an eruption on the sole, the side of the foot, and especially on the hollow of the instep. It is made up of deep-seated vesicles which appear singly or grouped. Some of these rupture, discharging serum; others dry up, leaving small brownish dots. In either case, dry scaly patches are produced.
87. *How can the type of ringworm fungus be determined?* There is no diagnostic clinical characteristic for each type. They can be distinguished only by culture and by the microscope.
88. *What is the etiology of ringworm?* The mycelia and spores of various fungi have been isolated. The trichophyton and the epidermophyton are the most common. Warm, moist weather favors their growth. The fungus is carried from one person to another by public baths, laundries, and by footwear. The fungi are very viable. Ordinary laundering does not destroy them. Infected socks should be boiled at least fifteen minutes to insure destruction. Hyperidrosis is a factor in their growth.
89. *What is the treatment for ringworm?* The best treatment consists of constant desquamation and exfoliation. Soap and water should be used for the dead epithelium. Vesicles, blisters, and pustules should be opened and all loose epithelium removed. For purulent types ammoniated mercury ointment is used. This may also be used at night in the dry types. Good results are obtained, especially during the day by a powder containing salicylic acid, 10 to 15 per cent., in talcum. This should be dusted between the toes and in the socks. Precipitated sulphur may be combined with salicylic acid either in powder or ointment form. Well-developed lesions respond to almost any germicidal treatment, but hidden fungi will delay recovery.
90. *What is pediculosis?* Pediculosis is a contagious animal parasitic disease, characterized by the presence of pediculi (lice), hemorrhagic points, and scratch marks.
91. *How is pediculosis classified?* Pediculosis is classified into three varieties: (a) pediculosis capitis, (b) pediculosis corporis, (c) pediculosis pubis. The second class is of interest to the podiatrist.

92. *Describe pediculosis corporis.* Pediculosis corporis is produced by the body louse. The parasite resides in the seams of the underclothing and is present on the skin only when foraging. The patient suffers greatly from itching, so that scratch marks are numerous all over the body. Blood crusts, pigmentation, and thickening may also be seen. The disease is common among poorer classes of adults, but is rare in children. Careful examination of the seams of the underclothing will reveal the presence of the parasite.
93. *What is the treatment for pediculosis corporis?* The treatment is first disinfection of the clothing and bed linen. These are thoroughly boiled or baked. Phenol will relieve the itching. When the clothing cannot be disinfected sulphur is the best agent to prescribe. It is used on the body in an ointment form, about 10 or 15 per cent., and powdered sulphur should be sprinkled in the clothing, bed linen, etc.
94. *What is scabies?* Scabies, or itch, is a contagious animal parasitic disease due to the *acarus scabiei*, and characterized by burrows and a multiform eruption, and attended with severe itching.
95. *What are the symptoms of scabies?* The parasite burrows into the skin and produces a papule, vesicle, or pustule at the point of entrance. Later a burrow is formed at this point. In well-marked cases there is an eruption of vesicles, pustles, crusts, and scratch marks. There is intense itching which is worse at night. The disease develops rapidly and if untreated will last many months.
96. *What is the etiology of scabies?* The disease is caused by the invasion of the *acarus scabiei*, a microscopic parasite. It is transmitted by direct contact or through bed clothes, etc.
97. *What is the treatment of scabies?* Scabies is treated much the same as the other parasitic skin diseases. The parasite must be destroyed and the inflammation must be subdued. The itch mite is easily killed by sulphur, balsam of Peru, or tar, sulphur being the most popular. Treatment is commenced by thoroughly washing the body with soap and water and then thoroughly anointing the entire body from the neck down with sulphur ointment. This is done twice a day for three days. Then another bath is taken and the underclothing and bed linen changed and sterilized. This usually suffices to cure.
98. *Describe ichthyosis.* Ichthyosis is a chronic hypertrophied disease of the skin characterized by dryness and scaliness of the skin and a variable amount of papillary hypertrophy. It is also called fish-skin disease.
99. *What are the symptoms of ichthyosis?* The skin is dry and hard with variously sized reticulated scales, resembling fish scales. It is influenced by the seasons, being worse in cold weather. There is no inflammation or itching, but it may be complicated with eczema.

100. *What is the etiology of ichthyosis?* The condition is congenital, although it does not usually manifest itself before the first or second year. In some cases heredity is an influence.
101. *What is the treatment for ichthyosis?* The treatment is purely external and consists of the use of agents which will remove the epidermal scales and soften the skin with ointments. Sodium bicarbonate baths are of value and should be used frequently. Lanolin or olive oil rubbed into the skin is also beneficial. In severe cases washing with soap and water twice a day followed by the use of ointments is indicated.
102. *What is elephantiasis?* Elephantiasis is a chronic hypertrophic disease of the skin and subcutaneous tissue, due to obstruction of the lymphatic channels. Its most common seat is the leg and foot and it results in enormous enlargement of the lower extremity, with papillary outgrowth.
103. *What are the symptoms of elephantiasis?* The disease begins as an erysipelatous infection, accompanied by fever, lymphangitis, pain, swelling, and heat and followed by a more or less permanent enlargement of the foot and leg. The acute attack recurs at intervals, the limb becomes larger with each successive attack. The limb becomes chronically hypertrophied and the skin and subcutaneous tissues are greatly thickened. The surface is pigmented and covered with warty growths and fissures. There is an offensive odor, and usually no pain.
104. *What is the treatment for elephantiasis?* The infective attacks are treated by rest, cold applications, and saline cathartics internally. Good food, tonics, and change of climate are important. Elastic compression by rubber bandages is the most efficient treatment for the leg. The X-rays are also used to promote absorption of the thickened tissues. In advanced cases treatment is of little value.
105. *How does tuberculosis manifest itself in the skin?* Tuberculosis of the skin appears in several ways: (a) lupus vulgaris, (b) scrofuloderma, (c) tuberculosis cutis orificialis, (d) tuberculosis verrucosa cutis. Lupus erythematosus is also thought to be due to the toxins of the tubercle bacillus.
106. *What is lupus vulgaris?* Lupus vulgaris is a tuberculous cellular new growth characterized by reddish or brownish patches consisting of papules and nodules and terminating in ulceration and scarring.
107. *What is the etiology of lupus vulgaris?* The etiology of lupus vulgaris is the invasion of the skin by the tubercle bacillus.
108. *Where is the favorite site of lupus vulgaris?* The favorite site of lupus vulgaris is the face. The extremities are only occasionally affected.
109. *What are the symptoms of lupus vulgaris?* The disease starts as small reddish or brownish papules. They are softer than the sur-

rounding skin and have a characteristic "apple jelly" appearance. The disease is chronic, often lasting throughout the life of the individual. The disease appears early in life.

110. *What is the treatment of lupus vulgaris?* The treatment is internal and local. The general treatment is diet, fresh air, exercise, etc. Cod liver oil, iodide of iron, etc., are used internally and tuberculin has also been used. Its value, however, is questioned. The local treatment is directed against the lupus tissue either by the use of chemical caustics or by the curette. Silver nitrate stick, pyrogalllic acid, arsenous acid, and chloride of zinc are generally employed.
111. *What is tuberculosis verrucosa cutis?* This disease called also postmortem wart or anatomic tubercle, is a warty tuberculosis of the skin occurring usually on the hands and feet and characterized by one or more verrucous nodules.
112. *What is the etiology of anatomic tubercle?* The disease occurs in those who come in contact with the cadaver in the dissecting room. Butchers are also subject to the infection.
113. *What are the symptoms of anatomic tubercle?* At the sight of an abrasion, there is first the appearance of an inflammatory vesicopustule. This becomes larger and burns and itches. When the lesion is fully developed it appears as a bean-sized, flattened warty growth. The fingers and toes are the favorite seats.
114. *What is the treatment for postmortem wart?* When seen early, repeated applications of tincture of iodine will cure the condition. Otherwise chemical caustics or curetting must be used.
115. *What is syphilis?* Syphilis is an infectious disease which may infect all the tissues of the body including those of the central nervous system.
116. *What is the cause of syphilis?* Syphilis is caused by the invasion through the skin or mucous membrane of the spirochaeta pallida, a microorganism of the spirillum type.
117. *How does syphilis first appear?* Syphilis first appears on the body at the point of infection as a primary sore or chancre. This sore may be genital or extra-genital.
118. *Describe the primary sore.* The primary sore may be a superficial abrasion, fissure, or ulcer, or it may be the characteristic hard cartilagenous, punched-out ulcer known as a Hunterian chancre. The chancre usually appears three to four weeks after exposure, and remains from six to eight weeks if untreated.
119. *What are the secondary symptoms of syphilis?* The secondary symptoms of syphilis appear after the primary sore has dried up. First, there is a swelling of neighboring lymphatic glands, followed by a generalized lymphatic enlargement. There are constitutional symptoms, sore throat, etc. The skin eruption is generalized and symmetric and is either macular, papular, or pustular. The lesions



are superficial and not destructive. The eruptions are often preceded by fever, headache, muscular and osseous pains, and general lassitude.

120. *What are the late or tertiary symptoms of syphilis?* The late or tertiary symptoms of syphilis may appear shortly after the secondary symptoms or there may be a lapse of years before they manifest themselves. The eruption is limited and unilateral and of a tubercular, gummatous, or ulcerative type. The lesions are deep seated and destructive.
121. *What is the course of the skin manifestations of secondary and tertiary lesions of syphilis?* The secondary skin lesions very often disappear even without treatment, whereas the tertiary lesions rarely do so, and continue indefinitely, progressing with time.
122. *What is a gumma?* A gumma is a new growth of connective tissue which appears some time after the contraction of the disease. It may involve any part of the body. The gummata found in the skin are a result of the infiltration of the subcutaneous tissue. Frequently they last for long periods before the overlying skin becomes inflamed and breaks down and ulcerates. The ulcer can be recognized by its punched-out appearance, dirty base, and undermined edges. Its favorite location is the upper third of the shin.
123. *What form of syphilis is found on the foot?* The papulosquamous syphiloderm is the form most often found on the sole of the foot. If both soles are involved, the eruption is probably an early one, but if it is unilateral, it is late. The lesions are flattened and covered with thin, scanty, dirty grayish scales. The size of the lesions is uniform but they present varied shapes. Beneath the scales are infiltrated, dull-red papules.
124. *What is the Wasserman reaction?* The Wasserman reaction is a chemical test made from the blood serum of a person in whom syphilis is suspected. A positive reaction is an absolute indication of the presence of syphilis in the body, but a negative reaction is not absolute. Thus, a person may be suffering with the disease and still have a negative Wasserman reaction.
125. *What is the treatment of syphilis?* The treatment of syphilis has for its object the complete destruction of spirochaetes in the body. Thus, it becomes necessary to use some agent which can be put into the blood stream which will reach everywhere so as to kill the organism. The earlier in the course of the disease that treatment is started the better will be the prognosis. Mercury and the organic forms of arsenic have proven to be the best remedial agents. Intravenous injections of salvarsan, neosalvarsan, and silver salvarsan are being used in conjunction with intramuscular injections of salicylate or bichloride of mercury. This combination of treatment given in regular and sufficient doses is apparently curing syphilis.



126. *What is the local treatment of syphilitic skin lesions?* Local treatment without the general treatment is worthless. In conjunction with general treatment, mercurial ointments and powders are used. White precipitate ointment and calomel dusting powders are the two most commonly used mercurials.
127. *Why is it important that the chiropodist be able to recognize syphilis?* This disease can be easily contracted in the course of treating a patient who is infected so that recognition and care against infection is essential. Further, the disease can also be transmitted from one patient to another, although this is not likely if asepsis and antisepsis are practiced.
128. *What syphilitic lesions are most infective?* The active moist lesions contain large numbers of the spirochaetes and while the microorganisms remain moist they are virulent.
129. *How can the presence of syphilis be positively determined?* If suspicious, the practitioner should diplomatically advise the patient to have a Wasserman test made. If this report should be positive, the case is immediately referred to the syphilologist. If the report be negative, and the clinical signs be sufficiently positive, the patient should be induced to visit the specialist. He can soon determine the absolute presence of syphilis by giving the patient a dose of salvarsan, which will make the blood positive if the patient be syphilitic. This is called a provocative dose.

## CHAPTER VIII.

# SURGERY

1. *What is surgery?* Surgery is that branch of the healing art which deals with the treatment of morbid conditions by manual or instrumental agencies.
2. *What are morbid conditions?* Morbid conditions are those conditions in the body which are not normal.
3. *How many classes of morbid conditions are there?* Three: (1) injuries, (2) infections, (3) diseases.
4. *What are injuries?* Injuries are processes due to physical agencies and include traumatism, the effects of heat and cold, chemicals, light, and electricity.
5. *What are infections?* Infections are the invasion of pathogenic bacteria into the system where conditions are favorable to their growth and multiplication.
6. *What are diseases?* Diseases and infections are closely linked. In this group come new growths, changes due to age and environment, and the idiopathic diseases.
7. *What is meant by the term idiopathic?* The term idiopathic indicates a disease which is primary and originates without any apparent extrinsic cause.
8. *What are bacteria?* Bacteria are unicellular plants of microscopic size, which produce fermentation, decomposition, or disease.
9. *How are bacteria classified?* Bacteria are classified according to their shape as follows: bacilli, cocci, spirillae.
10. *What are bacilli?* Bacilli are rod-shaped bacteria.
11. *What are cocci?* Cocci are round or oval bacteria.
12. *What are spirillae?* Spirillae are spiral-shaped bacteria.
13. *Are all bacteria capable of causing disease?* No. Those that cause disease are called pathogenic; those that do not cause disease are called non-pathogenic.
14. *What is a toxin?* A toxin is a poisonous chemical substance which is produced by bacteria or is formed in the tissues as a result of the presence of bacteria.

15. *How do bacteria enter the tissues?* Bacteria enter the tissues through wounds and abrasions and by penetrating the mucous membrane.
16. *What is meant by the term resistance?* The power of the tissues to resist the invasion of bacteria, although not thoroughly understood, is called resistance. The power of the white blood cells to destroy invading hosts (phagocytosis) may account for it in part, and the germicidal power of the blood serum may also account for this power. Resistance may also be due to the absence from the tissues of some substance necessary for the successful growth and multiplication of bacteria.
17. *What lowers the resistance of the body?* Anything that lowers the vitality by depressing the system will lower the resistance. Exhausting diseases such as anemia, diabetes, alcoholism, or exposure to cold, etc., will help lower resistance.
18. *What is meant by the term immunity?* By immunity is meant the ability to resist the invasion of any species of bacteria.
19. *How many kinds of immunity are there?* Two: natural and acquired immunity.
20. *What is natural immunity?* Natural immunity is the ability to resist disease which is natural with the individual. Thus, races of people are immune to certain diseases due to something in the body which does not allow that particular disease to develop.
21. *What is acquired immunity?* Immunity which has been produced by artificial means such as the injection of anti-toxins and serums, or by having had a disease and thus developing immunity against future attacks.
22. *What is sterilization?* Sterilization is the process of destroying pathogenic bacteria, usually by means of heat.
23. *What are the most important things to sterilize in any surgical procedure?* The instruments, the field of operation, the hands of the operator, and the dressings.
24. *What is an approved method of sterilizing the instruments?* Instruments are best sterilized by boiling them in water for about twenty minutes. A small amount of sodium carbonate (washing soda), a teaspoonful to the pint, is added to prevent rusting of the instruments.
25. *What is an approved method of sterilizing the field of operation?* The part is first cleansed with soap and water, then washed with ether to dissolve fats, then with alcohol, and finally painted with half strength tincture of iodine ( $3\frac{1}{2}$  per cent.).
26. *What is an approved method of sterilizing the hands of the operator?* The hands are scrubbed with tincture green soap and water up to the elbow for ten minutes, then rinsed in sterile water, then immersed in a solution of mercuric chloride (bichloride of

mercury), 1-2000, and finally dipped in alcohol, 60 per cent. Additionally they may be rubbed with equal parts of chlorinated lime and washing soda, this to be done after scrubbing and before rinsing.

27. *What is an approved method of sterilizing the dressings?* Dressings are best sterilized by subjecting them to superheated steam for a period of thirty minutes. This is done in an autoclave with a pressure of two or three atmospheres. If this apparatus is not available, then placing the dressings in an oven and subjecting them to a temperature of not more than 100 degrees centigrade for one hour, will suffice.
28. *What are antiseptics?* Antiseptics are agents which prevent or inhibit the growth of pathogenic bacteria.
29. *Into how many classes are antiseptics divided?* Two—general and local antiseptics.
30. *What are general antiseptics?* General antiseptics are those used for general purposes such as disinfecting a room, etc.
31. *Mention some general antiseptics.* Sunlight, heat, formaldehyde, chlorinated lime, sulphur, etc.
32. *What are local antiseptics?* Local antiseptics are agents which are used on a localized area, externally.
33. *Mention some local antiseptics.* Iodine, alcohol, phenol, peroxide of hydrogen, boric acid, Dakin's solution, mercuric chloride, etc.
34. *What is inflammation?* Inflammation is the reaction of the tissues of the body against injurious influences.
35. *What causes inflammation?* Inflammation is caused by any injury to the tissues by mechanical, thermal or chemical means, by the effect of electricity, or by the entrance and growth of bacteria in the tissues.
36. *What are the cardinal symptoms of inflammation?* The cardinal symptoms are redness, pain, heat, swelling, and impaired function.
37. *What causes redness?* Redness is due to the congestion of the blood.
38. *What causes pain?* Pain is caused by pressure exerted upon the sensory nerves by the surrounding swelling. The pulsation felt is due to the beating of the heart which forces the blood into the inflamed area, thus increasing the pressure at regular intervals.
39. *What causes the heat?* The heat is caused by the increased supply of warm arterial blood.
40. *What causes the swelling?* The swelling is caused by the dilated vessels and by the escape of blood serum into the tissues.
41. *What causes the impaired function?* The impaired function is caused chiefly by the pain which is increased by any attempt to use the part. Occasionally the loss of function is due to the direct action of the inflammation upon the nerves.

42. *What are the constitutional symptoms of inflammation?* The constitutional symptoms of inflammation are rise in temperature, with or without chill. There is also nausea, vomiting, diarrhea, sweating, and polyuria.
43. *What are the terminations of inflammation?* Inflammation may result in resolution, suppuration, necrosis or sloughing, or in the establishment of the chronic state.
44. *What is resolution?* Resolution is the gradual cessation of all the symptoms of inflammation until the part is normal.
45. *What is suppuration?* Suppuration means the formation of pus.
46. *What is pus?* Pus is serum containing white blood cells, dead and dying tissue cells, and bacteria.
47. *What is sloughing?* Sloughing is the death of tissues. Gangrene or necrosis is the death of the tissues from any cause. The dead part is called a slough.
48. *What is meant by the term "chronic state" in inflammation?* A chronic state is one in which there has been an interruption at some stage of resolution and there is a continuance of mild symptoms. Chronic inflammation usually lasts over a long period of time.
49. *What are the general indications to be observed in the treatment of inflammation?* The general indications to be observed in the treatment of inflammation are: (1) to combat the congestion of the parts, (2) to relieve tension, (3) to give free issue to the products of inflammation, (4) to produce early separation of sloughs.
50. *What is an approved method of relieving the congestion in inflammation?* An efficient method of relieving congestion is the application of a light gauze dressing, applied cold and continuously wet with any evaporating solution. This assists the inflamed tissues in combating irritating substances.
51. *What is an approved method of relieving tension in inflammation?* Cold constricts the blood vessels and in this manner relieves tension. Cold also checks the development of bacteria and thus often stops suppuration.
52. *What is an approved method of giving free issue to the products of inflammation?* The drainage of the products of inflammation (pus) is important in the treatment of such conditions. Free incision is indicated wherever possible and the drainage is hastened by the use of mild antiseptic wet dressings. The moist gauze absorbs the fluids from the wound and the chemical in the solution inactivates and washes away the bacteria.
53. *How can the separation of sloughs be hastened?* The separation of the dead tissue in an inflammatory condition is best hastened by stimulating granulation beneath the slough. This will cause

pressure on the slough and thus it will be separated from the living tissue. The use of ointments is often indicated to soften the necrotic area, the milder antiseptic ointments such as white precipitate ointment or scarlet red, 4 per cent., are usually employed.

54. *What is the effect of heat on inflammation?* Heat as well as cold exerts a soothing effect upon inflamed areas. Heat dilates the blood vessels and thus hastens repair in bruised or torn tissues. In infected areas the heat encourages bacterial growth and increased pus formation and is, therefore, contra-indicated where pus manifests itself.
55. *What is the effect of antiseptic wet dressings on inflamed areas?* Wet dressings are of great value in the treatment of inflammation, but antiseptic solutions should only be used where pus is draining from the lesion. Antiseptic wet dressings should never be used on the unbroken skin, for not alone is it valueless, except for the benefit of the moisture and cold, the chemical action of the substance may cause constitutional symptoms as well as local sloughing.
56. *What is the effect of astringent wet dressings on inflamed areas?* Astringent wet dressings have a beneficial effect by contracting the blood vessels, thus reducing tension. These should not be used in draining wounds unless the drainage is very free. The best astringent wet dressing is the official solution of aluminum acetate, diluted with an equal quantity of water.
57. *What is a wound?* A wound is a solution or loss of continuity or division of the soft tissues produced by some external force.
58. *How are wounds classified?* Wounds are classified according to their causation or nature as: incised, lacerated, contused, punctured, poisoned, and gunshot.
59. *What is an incised wound?* An incised wound is one that results from a sharp-edged instrument.
60. *What is a lacerated wound?* A lacerated wound is one in which the tissues are extensively torn or separated.
61. *What is a contused wound?* A contused wound is one that is the result of a diffused force and in which the edges and surrounding tissues are crushed.
62. *What is a punctured wound?* A punctured wound is one that is produced by a narrow instrument and is deeper than its external surface is broad.
63. *What is a poisoned wound?* A poisoned wound is when some poisoned substance enters a wound and causes local infection or constitutional symptoms.
64. *What is a gunshot wound?* A gunshot wound is one that results from firearms or from powder explosion.



65. *What is a contusion?* A contusion or bruise is a subcutaneous laceration in which the skin above is uninjured.
66. *What is an ecchymosis?* An ecchymosis, or black-and-blue mark, is a diffuse subcutaneous hemorrhage and is the result of a contusion.
67. *What is a hematoma?* A hematoma is a blood tumor or a circumscribed hemorrhage in the tissues, and is a result of a contusion.
68. *What is the treatment of wounds in general?* The general principles in the treatment of wounds are: (1) arrest hemorrhage, (2) bring about reaction, (3) remove foreign bodies, (4) make the wound aseptic, (5) drainage, (6) bring the edges in apposition, (7) proper dressing, (8) rest to the wounded part, and (9) combat inflammation.
69. *Briefly describe the arrest of hemorrhage in a wound.* Digital pressure immediately over the wound will control hemorrhage. Slight bleeding will soon stop on exposure to the air. Moderate hemorrhage ceases after the bleeding vessel has been compressed or clamped for a period of time. When a large vessel is injured it will be necessary to clamp and ligate it before blood will stop flowing. Various chemical agents called styptics are used for slight capillary bleeding.
70. *How is reaction brought about?* By reaction we mean response of the body to the shock induced by the production of the wound. In slight wounds there is little if any shock, but in larger wounds this is quite common. The body should be put in a recumbent position and the feet elevated slightly above the head. Hot-water bottles and hot blankets should be wrapped around the patient and injections of strychnine, brandy, or digitalis, or inhalations of amyl nitrate should be given. Do not give these stimulants until the bleeding part has been cared for, as all of these cause an increased heart action and a consequent increase in blood flow.
71. *How are foreign bodies removed from wounds?* Foreign bodies are removed by the forceps, being careful to remove everything visible to the eye. In badly lacerated or contused wounds, tissue that has been injured beyond repair should be considered a foreign body and removed with the scissors and forceps.
72. *How can the wound be made aseptic?* After foreign bodies have been removed, the surface, if hairy, should be shaved. The wound is then washed out with an antiseptic solution and clots, if they have formed, are also removed. Irrigation with a solution of mercuric chloride (corrosive sublimate), 1-4000, is then in order. It must be remembered that all accidental wounds are infected and must be treated accordingly.
73. *How are wounds drained?* Superficial wounds require no special drain. Large wounds should be drained for at least one day, and this is done by using a tube, silk, catgut, or gauze, the latter being

most commonly used. Infected wounds must always be drained and gauze put into the wound and a moist dressing above it is most efficient.

74. *How are the edges of wounds brought in apposition?* The edges of small wounds require no special care, but if the wound is a large one the edges recede and must be brought together by what is called suturing. The materials used for suturing are silk, silk-worm gut, and catgut. The latter is used where tension is slight and silk-worm gut is used where tension is marked.
75. *What is a suture?* A suture is the surgical uniting of two surfaces by means of stitches.
76. *What constitutes a proper dressing for wounds?* A proper dressing for wounds is one that will protect the wound from the ingress of foreign material and is usually moist or dry. Infected wounds are dressed with a moist dressing and sterile wounds with a dry dressing.
77. *What is meant by rest to the wounded parts?* Physiologic rest is essential to the prompt healing of wounds. If a wound is near or at a joint, the parts above and below should be immobilized. If a wound of the foot or leg is extensive, the patient should be kept in a recumbent position. Walking will delay healing, increase pain and make less certain the result.
78. *How is inflammation combated in a wound?* This is done by first thoroughly cleansing the wound and making it aseptic. Then, if it is properly protected and the patient rests properly, inflammation will be prevented.
79. *What is toxemia?* Toxemia is a condition in which one or more poisons are present in the blood which are not necessarily of bacterial origin or production. This condition includes diseases due to animal, vegetable, and mineral poisons.
80. *What is septicemia?* Septicemia is a systemic disease in which microorganisms or their toxins are present in the blood stream.
81. *What is sapremia?* Sapremia is the presence of the products of the putrefactive bacteria such as ptomains and toxalbumins.
82. *What is pyemia?* Pyemia is a condition in which metastatic abscesses arise due to the presence in the blood of pus-producing bacteria, either free or contained in pus cells.
83. *What are the symptoms of septicemia?* The symptoms of septicemia are chill about four to seven days after an injury, followed by fever. The pulse is small, weak, and frequent and there is vomiting and diarrhea. As the condition progresses delirium and stupor appear followed by coma and finally death. Urinary secretion is scanty.
84. *What are the symptoms of sapremia?* There is a marked rise in temperature, the skin becomes cold and clammy, there is marked prostration, and sometimes diarrhea. If these symptoms appear

when there is a wound present, immediate cleansing of the lesion and the practice of perfect antisepsis will prevent further complications. There is also a diminution of urine.

85. *What are the symptoms of pyemia?* The symptoms of pyemia are severe chill and sudden rise in temperature which lasts for a few hours and passes off with profuse sweating. The chills recur at irregular intervals. The general symptoms of vomiting, etc., resemble septicemia.
86. *What is hemorrhage?* Hemorrhage is the escape of blood from the blood vessels in large or small quantities and may occur either spontaneously or because of injury.
87. *What is spontaneous hemorrhage?* Spontaneous hemorrhage is bleeding that occurs in the organs and cavities of the body as a result of constitutional diseases such as tuberculosis and cancer, in which the erosion of the tissues has extended to the vessels. It is also a result of a constitutional tendency. Persons who have this tendency are called hemophiliacs.
88. *What is hemophilia?* Hemophilia is a disorder marked by a permanent tendency to profuse hemorrhages, spontaneous or traumatic, due to a defect in the coagulating power of the blood.
89. *How is hemorrhage due to injury classified?* Hemorrhage due to injury is classified as follows: (1) arterial, (2) venous, (3) capillary.
90. *How does arterial hemorrhage manifest itself?* Arterial hemorrhage may be easily recognized by the rapid spurting jets of red blood, occurring in time with the heart beat.
91. *How is venous hemorrhage recognized?* Venous hemorrhage occurs as a steady, even stream of dark blood. It is not affected by the heart beat and seems to flow from the wound like a spring wells from the earth.
92. *Describe capillary hemorrhage.* Capillary hemorrhage flows in a steady stream from the surface of a tissue. It is intermediary in color, being a mixture of both arterial and venous blood.
93. *Describe nature's efforts to control hemorrhage.* When an artery is cut, the inner structures curl up, thus partly closing the lumen of the vessel. Further, when the blood comes in contact with anything but the lining of the vessels, it coagulates. Thus, with the blood stream slowed up by the curled ends of the vessel, a clot develops in the cut end which seals it.
94. *How is arterial hemorrhage controlled?* Arterial hemorrhage is controlled by pressure above the wound, clamping of the bleeding vessel, and ligation of the cut ends.
95. *How is venous hemorrhage controlled?* Venous hemorrhage is controlled by pressure below the wound, clamping the vessel, and ligating the cut ends.

96. *How is capillary hemorrhage controlled?* Capillary hemorrhage is controlled by pressure immediately above the bleeding surface and by the use of styptics.
97. *What type of hemorrhage is usually met in the practice of chiropody?* The usual type of hemorrhage is capillary.
98. *What precautions must be taken when a patient is made to bleed?* Due to the fact that the feet are always contaminated with bacteria, hemorrhage, no matter how slight, is dangerous and may cause infection. The wound produced must be thoroughly cleansed with any of the standard antiseptics, iodine being a very popular drug. The wound must be dressed with a suitable dressing after all signs of bleeding have stopped.
99. *Describe an approved method of treating a wounded surface caused in removing an heloma.* The wound is washed with alcohol and then a cotton wound applicator dipped in Monsel's solution is applied. When bleeding has stopped, the part is painted with tincture of iodine and dressed with ichthyolated collodion or with a gauze dressing.
100. *What are styptics?* Styptics are agents which control local bleeding.
101. *Mention some of the common styptics.* The commoner styptics are Monsel's solution, alum, tannic acid, adrenalin chloride, and ferric chloride.
102. *Mention the various surgical conditions of which the chiropodist should have a knowledge?* It is not essential for the chiropodist to have a comprehensive knowledge of surgery, but he must understand the commoner surgical lesions that may manifest themselves in the foot. Among these are fistulae, fissures, sinuses, abscesses, furuncles, ulcers, synovitis, arthritis, various bone diseases including periostitis and osteomyelitis, gangrene, the various new growths or tumors, phlebitis, fractures, dislocations, sprains, and the various mechanical deformities of the foot.
103. *What is a fistula?* A fistula is an abnormal passage or communication between the surface and a deeper part of the body or connecting two natural cavities in the body.
104. *What is a fissure?* A fissure is a crack or a cleft in the skin.
105. *What is a sinus?* A sinus is a tract leading from the skin or another free surface into the cavity of an imperfectly healed abscess, or it may be the unhealed portion of a wound.
106. *What is the treatment of fistula and sinus?* The treatment of the conditions is similar in most instances. The tract is first cleansed, all foreign particles being removed. The channel is then laid open and the walls are curetted and touched with pure phenol and packed with plain or iodoform gauze. In severe cases, it becomes necessary to cut away all of the fibrous structures and suture the parts.

107. *What is the treatment for fissure?* Fissure usually occurs on the foot in the toe webs and is treated with astringents. (See Chiropody quiz.)
108. *What is an abscess?* An abscess is a circumscribed cavity in the tissues containing pus. The cavity is of new formation.
109. *Describe the formation of an abscess.* When pyogenic bacteria are deposited into the tissues, they multiply and immediately the tissues react to their presence, thus producing inflammation. The usual changes that occur in inflammation take place and soon there is an accumulation of the various constituents of pus. In the course of the inflammation, the surrounding tissues are protected by the formation of a fibrous wall which is called the abscess wall.
110. *What are the symptoms of abscess?* The local symptoms of abscess are marked swelling, redness, throbbing pain, and a sense of tension. The skin is glossy and after a time the fluid can be felt in the cavity. There may be chills and fever, depending on the severity of the condition.
111. *What is meant by pointing or "coming to a head"?* When pus is pent up in the tissues, such as is the case in abscess, the pressure within is great, and the pus will follow the line of least resistance to escape. This is toward the surface, and soon a small white area will appear, usually in the center of the inflamed area. The tissues of the skin soon break down at this point and the pus exudes.
112. *What is the treatment for abscess?* The treatment is free incision and drainage. The abscess should be opened early, even before pointing. This prevents a great deal of tissue destruction and hastens recovery. Wet dressings may be used when the abscess has been incised as this helps drainage and hastens the reduction of inflammation.
113. *What is furuncle?* A furuncle, or boil, is an acute circumscribed inflammation of the subcutaneous tissue and the deeper layers of the skin.
114. *What causes a furuncle?* Furuncle is caused by the entrance of the staphylococcus pyogenes aureus into the hair follicle through a slight wound.
115. *What are the symptoms of furuncle?* The symptoms are a red elevation which stings and itches. This elevation becomes larger and dusky in color. A pustule forms which discharges slightly and forms a crust. Inflammation spreads rapidly and soon the boil has a large red, tender base which is very painful. The swelling increases, the skin becomes edematous, the pain is severe and the center of the boil becomes raised. About the seventh day rupture occurs, pus runs out, and a core of necrotic tissue is found in the center of the opening.



116. *What is furunculosis?* Furunculosis is a condition where there are several boils which appear at one time or when one develops after another.
117. *What is the treatment for furuncle?* The treatment of furuncle consists of making a cross-shaped incision and applying wet dressings.
118. *What is an ulcer?* An ulcer is a loss of substance due to necrosis of a superficial structure or it may be defined as a suppurating open sore which shows no tendency to heal.
119. *What are the causes of ulcers?* There are two divisions to the cause of ulcers: (1) predisposing, (2) exciting. The predisposing causes are age, sex, occupation, and mode of living. The exciting causes are traumatism and infection.
120. *What are the varieties of ulcer found on the foot and leg?* The varieties found on the foot and leg are: (a) indolent or callous, (b) varicose, (c) tubercular, (d) syphilitic, (e) diabetic, (f) perforating.
121. *What is the cause of indolent or callous ulcer?* The cause of callous ulcer is both general and local. The general causes are typhoid fever, chronic inflammation of the kidneys, anemia, poor hygiene, improper food, overwork, and lack of sleep. Local causes are injury, exposure to heat and cold, irritation of the tissues, the presence of a foreign body such as a splinter, etc.
122. *What are the symptoms of callous ulcer?* The shape of these ulcers varies greatly as does the size. They may be round, irregular, or funnel shaped. The base of the ulcers are usually shallow, inflamed, and grayish yellow. The edges are flat and thin and the surrounding tissue is red and inflamed. Callous ulcer responds rapidly when treated antiseptically.
123. *What is the treatment for callous ulcer?* If inflammation is present and the part is painful, mild wet dressing such as boric acid solution is indicated. Rest is a very important part of the treatment and the patient must be impressed with the necessity of this measure. If necessary, the part must be splinted to prevent walking. When the acute inflammation has subsided, then granulation is stimulated by the use of ointments such as balsam of Peru, 10 per cent., or scarlet red, 4 per cent.
124. *What is a varicose ulcer?* A varicose ulcer is a chronic ulcer of the leg associated with varicose veins.
125. *What are the symptoms of varicose ulcer?* Before the actual appearance of the ulcer the patient complains of deep aching pains in the leg with a sense of fullness and fatigue. The ankles are swollen and the feet are cold. Small soft blue tumors appear on the leg which disappear on pressure. These are caused by a dilated vein. The surface of the ulcer presents unhealthy and imperfect granulations, secreting thin pus. The edges and



base are thickened and callous and the surrounding area is deeply pigmented. The parts look like a large pigmented scar which has broken down in the center.

126. *What is the treatment for varicose ulcer?* The treatment for varicose ulcer is first antiseptic cleanliness. The circulation of the blood and lymph must be improved by increasing the nutrition to the body. The ulcer should be washed once or twice a day and dressed with some mild antiseptic such as boric acid solution. When the discharge is slight ointments may be used. Rest is most important and support for the dilated veins should be provided. This is best done with elastic bandages or elastic stockings or with flannel bandages. A desirable method of supporting the veins is by the application of Unna's gelatine. The varicose veins are often operated upon.
127. *What causes a tuberculous ulcer?* A tuberculous ulcer is usually caused by the bursting of a tuberculous abscess through the skin.
128. *What are the symptoms of tuberculous ulcer?* The base of the ulcer is pale and covered with feeble granulations and gray shreddy sloughs. The edges are dull blue or purple in color and are undermined. The outline is irregular and a thin watery discharge containing shreds of debris escapes. The ulcer is superficial and with little or no pain. At times the ulcer is crusted over, the crust being thin and brown or black.
129. *What is the treatment for tuberculous ulcer?* If the ulcer is limited, the best treatment is the complete removal by means of the knife or sharp spoon, of the ulcerated surface and all of the infected area around it. This leaves a healthy surface from which granulations may grow. If there is danger of contraction due to the scar, then skin grafting should be employed. General treatment, consisting of tonics, fresh air, nutritious food, etc., is necessary.
130. *What causes syphilitic ulcers?* Syphilitic ulcers are caused by the breaking down of gummata in the tertiary stage of syphilis. Occasionally a superficial ulcer will appear resulting from a pustule in early syphilis.
131. *What are the symptoms of syphilitic ulcer?* The edges are sharp and have a punched-out appearance. The base is indurated, dirty, and sloughing, the slough being green. The remaining scar is characteristic; it is thin, dead white in color, pigmented irregularly, and when pinched, it wrinkles like tissue paper.
132. *What is the treatment for syphilitic ulcer?* The treatment is both general and local. Antisyphilitic treatment is essential. This consists of injecting mercury and salvarsan or neosalvarsan, or rubbing mercury into the skin. Local treatment consists of the use of mercuric chloride solution to wash the lesion, and dressings of mercurial ointments such as white precipitate, or the ulcer may be dusted with calomel powder. The lesion will

heal only when constitutional treatment is given and local treatment is useless otherwise.

133. *What is the cause of diabetic ulcer?* Diabetic ulcer is caused by a trauma over a given area which breaks down and ulcerates. It does not heal, due to the fact that the patient is suffering with a constitutional disease known as diabetes mellitus. This is a disease in which sugar is found in the blood and is excreted in the urine.
134. *What are the symptoms of diabetic ulcer?* Diabetic ulcer appears at any spot that has been injured or is subject to pressure, so that very often such an ulcer will develop in the foot over the site of a corn or callosity. There is a gradual breaking down in the center of the callous and the ulcer appears as a bluish, indolent, foul-smelling ulcer which secretes a small amount of watery pus. The callous surrounding the lesion is very abundant and often hides the ulcer.
135. *What is the treatment of diabetic ulcer?* Constitutional treatment is essential, and such cases belong to the specialist in diseases of metabolism. Rest of the parts is necessary, baking to stimulate circulation, and the use of stimulant ointments are in order. Scarlet red, 4 per cent., is useful as well as balsam of Peru, 10 per cent.
136. *What is the cause of perforating ulcer?* The cause of perforating ulcer is varied. There are several local as well as general factors responsible for it. The theories as to its cause are classified as mechanical, vascular, nervous, and mixed. The mechanical theory regards injury as the sole cause. If this were so, however, this type of ulcer would be common, whereas it is quite rare. The vascular theory assumes that arteriosclerosis is always present and is responsible. The nerve theory, which is the one most commonly accepted, is that perforating ulcer is due to a chronic peripheral neuritis. The mixed theory is that either vessels or nerves or both may be at fault.
137. *With what diseases is perforating often observed?* The diseases with which perforating ulcer is seen are locomotor ataxia, fractures of the spine, injuries to the spinal cord, diabetes, and injury and division of the peripheral nerves.
138. *What are the symptoms of perforating ulcer?* Perforating ulcer develops most readily where parts are subjected to pressure and irritation. It is found more often in males than in females and in adults between the ages of 40 and 60 years. Usually only one foot is involved, but occasionally it is bilateral. There is a formation of callous above the ulcerated area which when removed shows an unhealthy foul-smelling area which is usually deep. The ulcer eats into the surrounding tissues gradually involving all the tissues, including tendons, muscles, joints, and bone. The lesion shows no tendency to heal, even with the most careful and painstaking treatment, and is not painful or tender.

139. *What is the treatment for perforating ulcer?* Where the cause is locomotor ataxia or diabetes, this must be cared for. Great care must be taken in fitting the shoes so that no irritation is produced from this source. Rest is most important and little, if any walking should be permitted. All of the calloused epidermis should be removed and drainage must be perfected by enlarging the opening if necessary. Any pockets or sinuses should be opened thoroughly. Occasional curetments and cauterization with silver nitrate is often of benefit. The dressing may be either dry or wet, depending on the amount of discharge. These ulcers are most unsatisfactory to treat and should be cared for by the specialist.
140. *What is synovitis?* Synovitis is an inflammation of the synovial membrane of a joint.
141. *What is the cause of synovitis?* Synovitis is caused by simple injury, contusion or sprain, exposure to cold, and the presence of movable cartilage.
142. *What are the symptoms of synovitis?* The joint is painful, especially upon motion and particularly so at night. It is swollen, tense, and fluctuating. Local heat and tenderness are not usually marked. If there has been hemorrhage into the joint, stiffness will result due to the formation of a clot.
143. *What is the treatment for synovitis?* The treatment is rest and the application of ice bags. Even pressure with bandages will hasten absorption, but are painful when first applied. Occasionally it becomes necessary to aspirate the joint. This procedure is a very delicate operation, and should be done only as a last resort where one is reasonably certain that absorption will not take place.
144. *What is arthritis?* Arthritis is an inflammation of all the structures which enter into and form a joint. The structures that make up a joint are bone, cartilage, ligament, synovial membrane, and fibro-cartilage. Inflammation may begin in anyone of these tissues and sooner or later all are involved. The only structure which will sometimes become inflamed and not affect the other structures is the synovial membrane.
145. *How many classes of joint inflammation are there?* There are two distinct classes of joint inflammation: (1) the varieties of synovitis and (2) the varieties of arthritis. These inflammations may be acute or chronic.
146. *What are the symptoms of arthritis?* The symptoms are more severe than those of synovitis and are both local and general. The bacteria or their toxins are absorbed into the system producing the signs of general sepsis. The local symptoms are pain, tenderness, swelling, heat, redness, and loss of function. These symptoms are the same in synovitis, but in arthritis a sensation of crepitus is felt which is absent in synovitis.

147. *What is crepitus?* Crepitus is a scraping or scratching sensation felt when two bony surfaces are moved against each other with no protective structures between. This is caused by the destruction of the synovial covering of the bone ends in arthritis.
148. *What is the cause of arthritis?* The causes of arthritis are many. Trauma will cause it as will many constitutional diseases such as tuberculosis, syphilis, etc. Much of the so-called rheumatic arthritis has been traced to infections in the body far remote from the actual seat of trouble. These have been called focal infections and the most common locations are the teeth, tonsils, and urinary tract. When the infection is treated and cured, the local joint manifestation readily responds. Arthritis is also due to other infectious diseases such as measles, scarlet fever, smallpox, and erysipelas.
149. *What is traumatic arthritis?* Traumatic arthritis is an inflammation of the joint due to injury. There are two divisions of traumatic arthritis: (1) non-penetrating, (2) penetrating. The former is an ordinary twisting or contusion at the joint, and the latter is a violent injury in which the tissues within the joint have been torn.
150. *What are the symptoms of traumatic arthritis?* The symptoms of non-penetrating traumatic arthritis are much the same as those of synovitis except that they are more pronounced. Those of the penetrating type depend greatly on the extent of the injury. The great danger in this form of arthritis is the fact that infection very often follows the injury. This is called septic arthritis and is much more severe. The complications are many and often complete loss of the joint is the result.
151. *What is the treatment of traumatic arthritis?* The treatment for simple traumatic arthritis is rest and wet dressings. This will soon bring about a cure. The penetrating form requires a great deal of care, mostly of an antiseptic nature. It is essential that infection, if not already present, be prevented if possible. All cavities containing pus should be opened and drained and the wound frequently irrigated. Complete rest is necessary, and the patient must not be allowed to move the joint. The usual result in this type of case is ankylosis.
152. *What is ankylosis?* Ankylosis is a fixation or a stiffening of a joint. True or bony ankylosis is caused by the union of the bones in the joint.
153. *How is arthritis produced by focal infections?* The infection, located somewhere in the body, continues to discharge bacteria or their toxins into the system. These are carried by the blood stream to parts far remote where they lodge and accumulate. Soon there is sufficient irritation to set up an inflammation which gets progressively worse.
154. *How can the chiropodist be guided in determining focal infec-*

*tion as a cause for arthritis?* When an inflamed joint does not respond to proper treatment, and continues to remain inflamed, regardless of what local treatment is employed, it is a sign that the cause of the trouble is beyond the foot. Further examination will often show other parts of the foot involved and a careful notation of the patient's history will act as a clue.

155. *What is gonorrheal arthritis?* Gonorrheal arthritis is an inflammation of the joints due to the presence of the gonococcus in the joints. It is a typical example of how infections in one part of the body will cause trouble in another remote part.
156. *What are the symptoms of gonorrheal arthritis?* The inflammation is nearly always acute, beginning as an acute synovitis and soon involving the entire joint. The symptoms are those of septic arthritis with the exception that usually only one joint is involved. A chill with high fever is usually manifest.
157. *What is the treatment of gonorrheal arthritis?* Treatment must be directed toward the urinary tract so as to eradicate the supply of bacteria to the joint. The part must be immobilized and kept at rest. Very hot or very cold applications are comfortable and efficient. In the subacute stage, baking is of value, or better still, the application of diathermic electricity.
158. *What is periostitis?* Periostitis is an inflammation of the periosteum or bone covering.
159. *Into how many classes is periostitis divided?* Two: (1) acute, (2) chronic.
160. *Describe acute periostitis?* Acute suppurating periostitis rarely, if ever, occurs alone. Most of these cases are mild, superficial cases of osteomyelitis which form abscesses beneath the periosteum with an inflammation of the periosteum itself.
161. *What are the symptoms of acute periostitis?* The symptoms are those of acute osteomyelitis in a very mild form. There is a rise in temperature with a chill, and tenderness is felt over the shaft of the bone.
162. *What is the treatment for acute periostitis?* Incision over the area and drainage of the pus is often sufficient, but if the bone has become necrotic, it will necessitate the removal of the necrotic bone.
163. *Describe chronic periostitis?* A great many diseases cause an irritation to the periosteum, which results in a proliferation of the osteogenetic cells of the periosteum and a subsequent thickening of that structure. Such a thickening with the formation of new bone is seen after injuries and blows and sometimes after the occurrence of a superficial abscess in the soft tissues immediately above the bone.
164. *What are the symptoms of chronic periostitis?* Chronic periostitis is really not a disease itself, but is a manifestation of the



reaction of the periosteum to some irritant. Occasionally the pain is dull and heavy and sometimes it is more or less acute. In many instances the patient has no pain at all and recognizes the condition by the enlargement of the bone. The radiograph is a definite method of recognizing the exact character of the lesion.

165. *What is the treatment for chronic periostitis?* The cause must be recognized and removed if possible. In many cases, especially those in which no pain is felt, nothing can be done therapeutically.
166. *What is osteomyelitis?* Osteomyelitis is an acute suppuration of the bone due to an infection of the bone marrow by pyogenic bacteria.
167. *How does osteomyelitis begin?* The infection begins in the bone marrow and being confined in the hard substance of the bone, rapidly spreads within the marrow cavity.
168. *Mention some of the general causes that favor the occurrence of osteomyelitis?* Children are affected more than adults and boys about three times as often as girls. After an injury even of moderate severity, the resistance of the bone is lowered and it is more susceptible to pyogenic infection. Compound fractures, if not given strict aseptic care, will often terminate in osteomyelitis.
169. *What bones are usually affected in osteomyelitis?* The femur and the tibia are most usually affected, but no bone is exempt.
170. *What are the symptoms of osteomyelitis?* The onset is usually severe, beginning with a sharp localized pain. This pain is intense and in typical cases is excruciating. Swelling of the soft tissues about the bone is first cold but soon becomes edematous, red, and shows pitting on pressure. The adjacent joint may become tender and swollen, even though the infection has not involved the joint itself. There is high fever and the pulse is very rapid. The tongue is dry and coated and the face is drawn and flushed.
171. *What are the symptoms of chronic osteomyelitis?* Chronic osteomyelitis presents a characteristic picture. The limb is enlarged, and sinuses run from the skin into the bone, from which exude foul purulent discharges. When a probe is passed into the sinuses dead bone is felt at the bottom.
172. *What is the treatment of acute osteomyelitis?* Acute osteomyelitis is treated much the same as any other acute suppuration. The pus is drained by freed incision not only into the soft tissues but into the shaft of the bone itself. All necrotic bone must be removed.
173. *What is the treatment of chronic osteomyelitis?* In chronic osteomyelitis all necrotic bone must be removed and the cavity does



not heal for a long time. Discharges continue for months and there is always danger of secondary infection or erysipelas. Osteomyelitis in any form should be treated by the surgeon.

174. *What is osteomalacia?* Osteomalacia is an acquired disease in which the bones become softened. The first sign is pain in the bones, which is increased by pressure. There is also muscular cramps and contractures.
175. *What is osteoma?* Osteoma is a bony tumor which arises by growth from the periosteum. When it has no direct connection with the cortex of the bone it is called an exostosis.
176. *What is the treatment for osteoma?* Osteoma is usually painless unless it is near a joint where it interferes with normal motion. Complete removal is the only treatment.
177. *What is subungual exostosis?* Subungual exostosis is an overgrowth of the bone on the distal phalanx of the toe immediately under the nail.
178. *What are the symptoms of subungual exostosis?* There is a distinct elevation of the nail which causes it to grow in a grotesque manner. Pressure against the nail causes pain and often the parts are red and inflamed due to the irritation of the shoe against the elevated tissues.
179. *What is the treatment for subungual exostosis?* The growth must be completely excised, first removing the nail and taking care not to injure the nail bed. This precaution will insure a good nail when the wound has healed.
180. *What is gangrene?* Gangrene is the death of tissues in mass.
181. *What is mortification?* Mortification is a term used synonymously with gangrene.
182. *What is necrosis?* Necrosis also means the death of tissues, but is usually employed to denote the death of bone.
183. *What are the forms of gangrene?* There are two forms of gangrene: (1) dry and (2) moist.
184. *What is dry gangrene?* Dry gangrene is a condition which occurs because of the gradual cutting off of the blood supply, with the venous circulation intact. This permits of evaporation and a gradual drying of the tissues. Diseases of the arteries and pressure from growing tumors cause this form of gangrene.
185. *What is moist gangrene?* Moist gangrene is a condition in which there is a sudden cutting off of the blood supply or the blocking of the venous return. This form usually is caused by accidents, cold, acids, thrombosis, and embolism.
186. *What is thrombosis?* Thrombosis is a condition in which there is a blood clot occluding the lumen of a vessel.
187. *What is embolism?* Embolism is a condition in which a part

of a thrombus or any other foreign substance such as a particle of fat or a detached piece of tissue from a growth, is free in the blood stream. Such a particle may find lodgment in a blood vessel, thus blocking it.

188. *What are the causes of gangrene?* The causes of gangrene are trauma, constitutional diseases, thrombosis and embolism, cold, and the effect of certain chemicals.
189. *How does trauma act as a cause of gangrene?* The sudden cutting off of the blood supply due to a cutting or crushing accident will cause moist gangrene. The main artery alone need be cut to produce this. The crushing or pressure on a large vein will do the same thing, because the blood will not circulate due to the fact that there is no outflow.
190. *How do constitutional diseases act as a cause of gangrene?* Certain diseases affect the lumen or size of the blood vessels, slowly reducing it and finally arresting the stream of blood flowing through them. The dry or moist form may develop, depending on the length of time required to cut off the circulation.
191. *Mention some of the diseases which will cause gangrene?* Diabetes, arteriosclerosis, Reynaud's disease, obliterating endarteritis, and thromboangiitis obliterans.
192. *Explain how thrombosis and embolism cause gangrene.* These conditions cause a sudden or a gradual stoppage of the blood stream in a vessel and consequently produce moist or dry gangrene depending on the time required for the obstruction in the vessel to become complete.
193. *Explain how cold acts as a cause of gangrene.* When the body is exposed to extremely low temperatures, the vessels are affected and blood ceases to flow in them. This causes death of the tissues to a greater or lesser degree, depending on the severity and length of exposure. Tissue destruction may be limited to a circumscribed patch or an entire extremity may be affected. This form of gangrene is always moist.
194. *Explain how chemicals act as a cause of gangrene.* Carbolic acid and other chemicals when applied to the tissues even in weak solutions will cause death of the part by direct action of the chemical. Moist gangrene is the rule and the part presents a hard, shriveled, black appearance.
195. *What are the symptoms of dry gangrene?* Dry gangrene usually develops in the toes and feet and the principal symptoms which point to its advent are coldness, numbness, pain, and tingling in the feet and muscles of the leg. Very often for months before there are any local signs the patient will complain of severe burning pain at night when the feet are warm in bed. An injury such as a bruise or the cutting of a corn may act as the exciting cause of the lesion. The parts become congested and gradually assume a dark purple color which finally becomes black.

The gangrenous area itself is painless but the surrounding tissues are congested and often are very painful. The dead tissue emits little odor.

196. *How does dry gangrene spread?* Dry gangrene spreads slowly. One or two toes may be first involved and the disease may then spread to the rest of the foot and the leg. There may be fever, depending on the size of the area involved. During the progress of the disease pain is usually present to a greater or lesser degree, sometimes being very intense. This is due to the fact that the nerves are usually the last of the tissues to die.
197. *What are the symptoms of moist gangrene?* Moist gangrene comes on suddenly and the affected part is insensitive. The skin is cold, pale and mottled, purple, green and red, and finally dark colored. Blebs containing brownish serum form upon the surface, and the tissues rapidly undergo putrefactive changes. The living tissues become inflamed and the separation of the dead tissue from the living is effected by an ulcerative inflammation.
198. *What are the constitutional symptoms of moist gangrene?* The patient will exhibit the signs of inflammation, viz., fever, rapid pulse, etc., and if septic infection is intense, may die from septicemia.
199. *How is the living tissue separated from the dead tissue?* In both forms of gangrene, when the gangrenous process has been arrested, the dead tissue is separated from the living by a process of inflammation. The living tissue becomes acutely inflamed and granulations spring from the living tissue as a result of the inflammation and there is pus secreted from the granulations.
200. *What is the line of demarcation?* The line of demarcation is the line or zone of inflammatory reaction which separates the living from the dead tissue in gangrene.
201. *How can the chiropodist assist in making an early diagnosis of gangrene?* It must be remembered that gangrene is most common in those past middle life and precautions must be taken to prevent abrasions and wounds to these patients. It should become a regular practice to take the foot pulses of every patient of this class, both the dorsalis pedis pulse and the posterior tibial pulse being easily detected with practice. If such pulses cannot be felt the patient should be diplomatically advised to consult the physician. When the foot becomes red or blue when hanging and pale when elevated it should act as a warning to the chiropodist that something is wrong with the circulation.
202. *What is the treatment for gangrene?* Amputation back of the affected area, through healthy tissue is the rule in gangrene. In diabetic gangrene, the amputation must be done unusually high. Thus, if a toe is gangrenous, it will be necessary to amputate through the lower third of the leg. In other forms, after the line of demarcation has been established, amputation through the joint above is the procedure.

203. *What are varicose veins?* Varicose veins are irregular, permanently dilated veins which pursue a tortuous course. They are usually found in the leg, and are very common in adults.
204. *What are the causes of varicose veins?* The causes are obstruction to venous return and weakened heart action which lessen the propulsion of the blood. Standing upon the feet for long periods is a cause and these veins are found in females during and after pregnancy. Pressure upon the vein causes a weakening of the valves contained therein and dilation is more marked. The veins also become longer and thus do not remain straight, but twist and turn.
205. *What is the treatment of varicose veins?* The treatment of varicose veins is either palliative or curative. The palliative treatment consists of attention to the general health, stimulation of the circulation, and the prevention of constipation. Locally the veins are supported by flannel or elastic bandages or by elastic stockings. The curative treatment consists of resecting the vein or cutting out the vessel. There are several operations for this condition.
206. *What vein is most commonly affected in varicose veins?* The vein most frequently affected is the internal or long saphenous vein.
207. *What is phlebitis?* Phlebitis is an inflammation of a vein.
208. *What are the symptoms of phlebitis?* The symptoms of phlebitis are pain along the track of the inflamed vein and tenderness. The overlying skin is red, hot, and tender and the lymphatics in the groin swell. There is marked edema, but the inflamed veins may be felt through the swelling. There is high fever, and chills followed by profuse sweats. The tongue is dry and parched, there is delirium and general distress.
209. *What is the treatment for phlebitis?* Wounds of any description should be kept aseptic, thus preventing phlebitis. The part is rested and the foot or leg kept elevated. An aqueous solution of ichthyol, 25 per cent., is of benefit for the superficial inflammation. Poultices of kaolin are of great benefit as are compresses of lead and opium wash. If infection is manifest it becomes necessary to operate. There are several operations, depending on the state and development of the inflammation.
210. *What is a tumor?* A tumor is any swelling, but technically it is a circumscribed growth not inflammatory in character, which arises from a pre-existing tissue but which grows independent of normal rate of growth and serves no physiological function.
211. *How are tumors classified?* Tumors are classified in several ways such as malignant and innocent, and solid and cystic.
212. *What are malignant tumors?* Malignant tumors are those which grow rapidly, infiltrate or adhere to surrounding tissues, are very painful, recur after removal, cause loss of weight and strength, and finally cause death. They are called cancers.

213. *What are innocent tumors?* Innocent or benign tumors are those which grow slowly, the symptoms are purely local, and the general health is not effected by them, except indirectly.
214. *What are solid tumors?* Solid tumors are those which are made up of solid tissues.
215. *What are cystic tumors?* Cystic tumors are hollow and filled with fluid or semi-fluid contents.
216. *Mention the types of malignant tumors.* There are two types of malignant tumors: (1) carcinomata, which spring from epithelial tissue, and (2) sarcomata, which spring from connective tissue.
217. *Mention the types of innocent or benign tumors.* Innocent or benign tumors are classified according to the tissue in which they grow. Thus, bone tumors are called osteomata; muscle tumors, myomata; fibrous tissue tumors, fibromata; fatty tissue tumors, lipomata; cartilage, chondromata; blood vessels, angiomata; lymphatics, lymphangiomata; glandular, adenomata, etc.
218. *What is the treatment for tumors?* All tumors must be excised. The malignant growths require very extensive surgery, for there is a tendency to recurrence in these. The benign tumors are excised, and if properly done, show no tendency to recurrence.
219. *What is a sebaceous cyst?* A sebaceous cyst is a tumor resulting from retained sebum.
220. *What are the characteristics of sebaceous cyst?* They are found almost anywhere on the body surface and occasionally on the sole of the foot. They range in size from a millet seed to the size of an egg. They may be single or multiple and occasionally they break down and ulcerate.
221. *What is the treatment for sebaceous cyst?* The treatment for sebaceous cyst is much the same as for other innocent tumors. Incision followed by dissection and removal is curative.
222. *What is a fracture?* A fracture may be defined as a broken bone.
223. *How are fractures classified?* Fractures are classified as follows: Incomplete, complete, comminuted, impacted, and compression or crushing fractures.
224. *What is an incomplete fracture?* An incomplete fracture is one in which the fragments are not completely detached and which involves only a portion of the bone. Among the incomplete fractures are the greenstick, which is a bending rather than a breaking of the bone and seen mostly in children; fissured fractures in which there is a split or crack in the bone; depressed fractures in which one or more segments of broken bone are depressed. This latter type is common in fracture of the skull.
225. *What is a complete fracture?* A complete fracture is one in which the fragments are entirely separated. They are classified as simple, multiple, complicated, and compound.



226. *What is a simple fracture?* A simple fracture is one in which the bone is broken into two or more fragments, the lines of which are continuous with each other.
227. *What is a multiple fracture?* A multiple fracture is one in which there is a simultaneous fracture of two or more non-adjacent bones or in which there are two or more fractures in the same bone, the lines of which are not continuous with each other.
228. *What is a complicated fracture?* A complicated fracture is one in which the fracture is accompanied by injury to the nerves, muscles, etc.
229. *What is a compound fracture?* A compound fracture is one in which a fragment of the bone has penetrated the soft tissues and protrudes through the skin. This type of fracture is serious because infection often follows it.
230. *What is a comminuted fracture?* A comminuted fracture is one in which there has been extensive splintering of the fragments.
231. *What is an impacted fracture?* An impacted fracture is one in which the fragments are driven into each other, causing a shortening of the bone. This is common in the neck of the femur.
232. *What is a compression or crushing fracture?* A compression or crushing fracture is one in which the broken bones are compressed or crushed. This type occurs after falls from great heights on the sole of the feet.
233. *What is the cause of fractures?* The cause of fractures is traumatic and pathologic or spontaneous. In traumatic fracture the bone which is normal, breaks as a result of violence, and is the most usual type of condition. In pathologic or spontaneous fracture, the strength of the bone has been diminished by some preceding abnormal or pathologic change. When such a bone is broken the violence necessary to cause the break would have no such effect upon a normal bone.
234. *Why do bones break more readily in aged people than in young people?* The bones of the body are strongest at middle age. Up to that time they are elastic and yielding. In old age certain changes take place which cause the hard outer portion of the bone to become thinner. Such a bone is more easily broken than otherwise.
235. *What are the symptoms of recent fracture?* In a recent fracture a careful examination will reveal swelling, pain, and restricted motion. Movement of the parts will produce crepitus, and the muscles will be found to be spastic. A radiograph will positively determine the presence of a fracture and should always be made at two different angles.
236. *What is the treatment of fractures?* The treatment is divided into first aid and permanent treatment. First aid is of great importance, for the final result in the treatment of fracture often depends on



what was done for the patient immediately after the fracture occurred. The patient is made comfortable and the part should be immobilized by the use of temporary splints. The type of dressing must depend on the nature of the fracture as well as on the materials available. After first-aid treatment has been given, the surgeon will care for the condition by properly reducing the fracture and applying proper permanent splints and dressings.

237. *What is meant by the term reduction?* Reduction means the replacement of fragments of broken bone as nearly as possible in the proper positions.
238. *What are the common fractures of the foot and leg?* The most common fractures of the foot and leg are Pott's fracture, fracture of the tarsal bones, fracture of the metatarsal bones, and fracture of the phalanges.
239. *What is Pott's fracture?* Pott's fracture is a fracture of the lower end of the fibula and the tibia. This is caused very often by forcible inversion or eversion of the foot. If the foot turns inward, then the outer malleolus will be broken first and if the movement continues, the inner malleolus will also be broken. If the foot turns outward, then the reverse is the order.
240. *What is a dislocation?* A dislocation is a displacement from each other of the articular ends of the bones which make up a joint.
241. *What are the symptoms of dislocation?* A careful history will reveal the exact nature of the accident and examination should be made to note the position of the part, alterations in contour, and the presence or absence of bony prominences. The part must be carefully examined with the fingers (palpation) to learn the relation of the displaced ends of the bone, unless swelling be too great or the patient be too fat. The X-ray is of great value in cases of this kind.
242. *What is the treatment of dislocation?* Reduction as soon as possible is necessary and this often causes the displaced bones to go back to their normal position with a snap and motion is immediately restored. In some severe cases this is not possible and other methods must be employed. After reduction, a bandage which is sufficiently strong to keep the joint immobilized should be applied for about two weeks, after which passive motion and massage are used.
243. *What is a sprain?* A sprain is an injury to a joint in which the ligaments are pulled upon and lacerated but without dislocation and fracture. It is due usually to a sudden wrenching of the joint.
244. *What joint is most usually sprained?* The ankle joint, due to its flexibility and constant use in weight bearing, is most frequently sprained.
245. *What are the symptoms of sprained ankle?* The pains in the joint are very severe and there is often nausea. Motion is lost and

swelling is marked. After a few days pain and tenderness become intense and discoloration appears. An X-ray should be taken of the injured part so as to make certain that no fracture exists.

246. *What is the treatment of sprained ankle?* Immediately after injury the part should be kept cold and under pressure to limit inflammation. This is done by applying absorbent cotton, wet with cold water, bandaging with a wet gauze bandage, and then applying an ice bag. Lead and opium wash is often used as a wet dressing and when swelling begins to subside, massage and passive motion are used. Bandaging and adhesive-plaster dressings, properly applied are very valuable in relieving the pain of sprained ankle and often permit the patient to walk where ordinarily this would be impossible. Such dressing should not be used, however, when the lacerations to the ligaments have been very severe and there is marked extravasation. The basket-weave dressing and the Gibney dressing are the most popular dressings for sprained ankle.
247. *What is hallux flexus?* Hallux flexus, or hammer toe, is a deformity of the toe, usually the second or third, in which the distal phalanx is flexed and rests on the ground, while the second and first phalanges point upward, causing a prominence which is subject to helomata and callosities.
248. *What is the treatment for hammer toe?* Attempts to straighten out the toe with various splints and dressings are usually unsuccessful. Tenotomy of the flexor tendon in which the lateral ligaments have been cut is of value occasionally, especially if the joint capsule is sufficiently injured in the course of the operation so as to cause ankylosis of the joint while it is being held in its normal position by a splint. When these methods fail, amputation is the only certain procedure.
249. *What is hallux valgus?* Hallux valgus is a deformity in which the great toe is bent outward.
250. *What are the symptoms of hallux valgus?* The great toe is displaced outward and the skin over the prominence of the joint is red and shiny. Often the bursa at this point is enlarged and in a chronic state of inflammation, and the joint is sensitive and painful upon pressure.
251. *What is the treatment for hallux valgus?* The treatment is palliative and curative. Palliative treatment consists of wearing shoes which do not press upon or irritate the enlarged joint, and the application of shields for further protection. The curative treatment consists of operating so as to remove the enlarged head of the metatarsal bone. There are several operations for this condition all of which vary slightly but all accomplishing the same result. Where the patient suffers so that palliative measures prove futile, an operation at the hands of a skilled surgeon should be advised.
252. *What is talipes, or club foot?* Talipes, or club foot, is a congenital

or an acquired deformity in which the foot assumes various shapes and accordingly is divided into: (1) talipes equinus, (2) talipes equinovarus, (3) talipes equinovalgus, (4) talipes calcaneus, and (5) talipes cavus.

253. *What is talipes equinus?* Talipes equinus is a permanent extension of the foot so that only the ball of the foot rests on the ground.
254. *What is talipes equinovarus?* Talipes equinovarus is a permanent extension and inversion of the foot.
255. *What is talipes equinovalgus?* Talipes equinovalgus is a permanent extension and eversion of the foot.
256. *What is talipes calcaneus?* Talipes calcaneus is a permanent dorsi-flexion of the foot so that the weight of the body rests on the heel only.
257. *What is talipes cavus?* Talipes cavus, pes cavus or hollow foot, is a condition in which the arch of the foot is greatly exaggerated.

(NOTE: No mention has been made of the various orthopaedic conditions which the chiropodist treats, nor have the chiropodial foot lesions been discussed, this being left for another section of this series of quizzes.)

## CHAPTER IX.

# PRACTICAL CHIROPODY

1. *What is chiropody?* Chiropody is the scientific care of the foot in health and in disease.
2. *What is podiatry?* Podiatry is a newer term used to designate the science of foot care.
3. *What type of foot lesions are usually included in the practice of chiropody or podiatry?* The minor foot lesions are usually included in the practice of chiropody and in some parts of the United States the laws also permit the treatment of mechanical disturbances by other than operative means. The scope of practice is limited by laws in most states and practitioners must be governed by these laws.
4. *How is the practice of chiropody or podiatry usually divided?* The practice of chiropody or podiatry is usually divided into two divisions: (a) The surgical, which includes those lesions that are treated by operative means; (b) orthopaedic, which includes those lesions which are treated by mechanical means. (The former type of lesions will be the subject of this quiz.)
5. *Mention the various lesions usually treated by the chiropodist.* The lesions usually treated by the chiropodist are: (a) heloma, (b) verruca, (c) calloused nail groove, (d) ingrown toe nail, (e) cub nail, (f) atrophy of the nail, (g) bursitis, (h) chomatlon, (i) fissures, (j) blisters, (k) burns, (l) hyperidrosis, (m) bromidrosis, (n) anidrosis, (o) ulcers, (p) vocational foot disorders.
6. *Why is a knowledge of asepsis and antiseptics essential to good chiropody practice?* Nearly all of the procedures in chiropody are such that the patient is exposed to infection from pathogenic organisms. Unless the necessary precautions against bacterial invasion are taken, infection must ensue.
7. *What local antiseptics are best suited for chiropody practice?* The following local antiseptics are usually employed in chiropody practice: alcohol, iodine, bichloride of mercury, boric acid, Dakin's solution, hydrogen peroxide, phenol, white precipitate, solution of cresol compound, potassium permanganate, etc. (See Surgery quiz.)
8. *In what forms are antiseptics used in chiropody?* Antiseptics are used in three forms: (a) liquids, (b) ointments, (c) powders.

9. *What is sterilization?* Sterilization is the process of destroying bacteria, usually by means of heat.
10. *How can the instruments used in daily practice be sterilized?* The best procedure is to boil the instruments immediately before using them and this should be done wherever extensive incisions are to be made. For the instruments used in operations where hemorrhage is accidental, immersion in pure phenol followed by alcohol is efficient. (For details of sterilization, see Surgery quiz.)
11. *What is meant by the term "hygiene"?* Hygiene is the science of health.
12. *What is meant by the hygiene of the foot?* By hygiene of the foot is meant those procedures which should be followed to keep the foot in a healthy condition.
13. *What does hygiene of the foot comprise?* Hygiene of the foot comprises the proper fitting of shoes and stockings, the cleansing of the foot, and the proper exercising of the muscles of the foot and leg so that function can continue without strain or fatigue.
14. *What general advice should be given to the patient about shoes and stockings?* The patient must be advised about the danger of wearing short and narrow shoes, especially with high heels. The shoe must be sufficiently long and wide to accommodate the foot under weight bearing and must be snug in the heel to prevent slipping of the foot in the shoe. The value of vici kid leather over calfskin and patent leather should also be explained. The stockings must be sufficiently long so that the toes are not pulled toward the central line of the stocking and should be of a material which will absorb moisture.
15. *What is the alternate foot bath?* The alternate foot bath is a hygienic measure which acts as a tonic for the structures of the foot. It is given by immersing the feet in hot water for two minutes and then immersing them in cold water for one minute. This is continued five or six times, starting with hot water and ending with cold water. The feet are then thoroughly dried and care is taken that no moisture is allowed to remain between the toes.
16. *Why is exercise essential to good foot care?* Persons who are engaged in sedentary occupations do not use certain groups of muscles in the foot and leg and unless these muscles do a given amount of work each day they will become atrophied and shortened. The calf muscles are most often affected in those who sit for most of the day and in those who wear high heel shoes. Thus, if the calf muscles are not given a certain amount of exercise, they soon become incapable of performing their functions, and strain is put upon parts which soon terminates in serious disorders.
17. *Should the style of a shoe be changed suddenly or gradually?* The style of shoe should never be suddenly changed, especially in an adult. A person who has been wearing a certain type of shoe

for a long period of time has permitted the various structures to become adapted to the shoe, and if a sudden change be permitted, great strain will be put on the parts that have not been in use. No matter how bad a shoe might be, and this is especially true in high-heel shoes, the patient should be advised to make the change to a good shoe gradually, so as to slowly permit the parts to become accustomed to the change.

18. *What is a dressing?* A dressing is the material applied to a wound for the purpose of protection, stimulation, exclusion of air, or the prevention of irritation of the affected area.
19. *How many classes of dressings are used in chiropody?* There are four classes of dressings used in chiropody: (a) the moist dressing, (b) the dry dressing, (c) the ointment dressing, (d) the occlusive dressing.
20. *What is the moist dressing?* The moist dressing is composed of several thicknesses of gauze applied to a part and moistened with some antiseptic or astringent solution. There are two kinds of moist dressings—the evaporating and the non-evaporating.
21. *Describe the evaporating moist dressing.* This dressing is called a wet dressing, and is composed of several thicknesses of gauze, saturated with a solution and allowed to remain uncovered so that evaporation takes place. The gauze is remoistened from time to time so that the dressing is kept continuously wet. Independent of the action of the drug used in the solution, this dressing reduces heat and causes local anemia.
22. *Describe the non-evaporating moist dressing.* This dressing is composed of several thicknesses of gauze saturated with a solution and then covered with some impervious covering such as oil silk, gutta percha, or fishskin. This dressing, independent of the drug used, is heat producing and hyperemic.
23. *When is the evaporating moist dressing indicated?* The evaporating moist dressing is used wherever infection and inflammation are present, especially in draining wounds.
24. *When is the non-evaporating moist dressing indicated?* The non-evaporating moist dressing is used only on the unbroken skin in cases such as sprains and bruises, but never in the presence of pus. The warmth produced by this dressing is congenial to bacterial growth and in infections, aggravates the condition.
25. *Describe the dry dressing.* The dry dressing is several thicknesses of sterile gauze which is applied to a part and allowed to remain dry. The dry dressing may be composed of the gauze only or a dusting powder may be added which is either antiseptic, astringent, or stimulant.
26. *When is the dry dressing indicated?* The dry dressing is indicated in cases where the wound is aseptic and is to be kept so, or where there is free drainage and no drugs are indicated. The



gauze may be inserted into the wound to act as a wick for drainage or it may be applied over the entire area. Dusting powders are never used on a draining wound and are indicated only when a specific action of a drug is desired. Thus parathesin may be dusted into a painful wound to relieve pain and the entire area then protected with gauze.

27. *Describe the ointment dressing.* The ointment dressing is one in which an ointment is held in place either by gauze, cotton, or lint. The ointment may be spread upon the fabric used or it may be applied directly to affected part.
28. *When is the ointment dressing indicated?* The ointment dressing is indicated in superficial inflammations such as chilblains, bur-sitis, etc., but is never used on a wound that is discharging freely, as it tends to retard drainage.
29. *Describe the occlusive dressing.* The occlusive dressing is one which excludes the air and completely seals the parts. This is obtained by the use of collodion, either plain or medicated, and compound tincture of benzoin.
30. *Mention the various collodions used in chiropody.* There are four preparations containing collodion used: (a) iodized collodion, (b) ichthyolated collodion, (c) benzoated collodion, (d) salicylated collodion.
31. *What are the uses of iodized collodion?* Iodized collodion is used to protect the tender tissues after the removal of helomata and callositas. The collodion protects and the iodine acts as an anti-septic and counter-irritant. It contains 5 per cent. iodine.
32. *What are the uses of ichthyolated collodion?* Ichthyolated col-lodion is used to protect previously pared callouses and also in chilblains as an antiphlogistic and stimulant. It contains 15 per cent. ichthyol.
33. *What are the uses of benzoated collodion?* Benzoated collodion may be used to protect helomata and callositas after cutting. It is also efficient as a stimulant in chilblains and as a protective for blisters. It contains 5 to 10 per cent. of the compound tincture of benzoin.
34. *What are the uses of salicylated collodion?* Salicylated collodion is used in the medical treatment of helomata and callositas, acting as a disintegrant to the skin. It should never be used on normal epidermis. It contains about 10 to 15 per cent. salicylic acid and 2 per cent. extract of cannabis Indica, in plain collodion.
35. *When is collodion and its preparations contra-indicated?* Col-lodion, either plain or medicated, is never used on a surface that is discharging. The collodion seals up the parts and thus pre-vents throwing off of exudates. Retention of these is harmful to the healing of the parts.
36. *Describe the impervious coverings used in moist dressings.* There

are three materials most commonly used for non-evaporating moist dressings: (a) Oiled silk, (b) gutta percha tissue, (c) fishskin. These materials when applied over a moist dressing prevent evaporation. Oiled silk is the strongest of the three, but is more bulky and it is on that account that gutta percha or fishskin are preferred in chiropody practice. The gutta percha may be firmly adhered to the surrounding skin by heating the edges and then lightly pressing them against the skin. The heating melts the rubber and it is thus vulcanized to the epidermis.

37. *What is a bandage?* A bandage is a strip of gauze, muslin, flannel, or other material of varying widths and lengths used for retaining dressings, applications, and splints and to produce compression. Occasionally they are used to retain heat.
38. *What materials are used for bandages?* The various materials used for bandages are gauze, muslin, flannel, elastic cloth, and rubber.
39. *What is a roller bandage?* A roller bandage consists of one piece of material rolled in the shape of a cylinder, having a core and a free end.
40. *What is a double roller bandage?* A double roller bandage consists of one piece of material rolled from both ends so that when it is completed there are two cylinders and no free end.
41. *What is a plaster of Paris bandage?* A plaster of Paris bandage is composed of a piece of gauze or crinoline into the meshes of which plaster of Paris has been thoroughly rubbed. The bandage is rolled and when ready for use is immersed in water and then applied. It then becomes hard and solid and is used to prevent motion in a part. It is used in general surgery for fractures and in chiropody for making impressions of the feet for mechanical appliances.
42. *What bandages are used in the practice of chiropody?* The bandages most commonly used in the practice of chiropody are the spiral bandage of the great toe, the figure-of-eight bandage of the ankle, and the spiral reverse bandage of the leg.
43. *Describe the spiral bandage of the great toe.* The spiral bandage of the great toe is made by first locking the bandage at the base of the toe by one or two circular turns. Recurrent turns are then made to cover the distal end of the toe and these are secured by a circular turn at the base of the toe and then the spiral turns are made to the distal end of the toe. The spirals are then applied to the base of the toe and the bandage finished by tying off or adhering with adhesive plaster. One-inch bandage is used.
44. *Describe the figure-of-eight bandage of the ankle.* The bandage is locked by a few circular turns around the ankle. These turns should be started with the free end pointing toward the inner side of the foot. The roller is then passed from behind the tendo Achillis over the inner malleolus, diagonally across the dorsum of

the foot to the base of the fifth metatarsal, across the plantar surface, and diagonally back over the dorsum of the foot to the outer malleolus and around the tendo Achillis. The second turn is then started, overlapping the preceding one about two-thirds or three-quarters, and this is continued until the desired area is covered.

45. *Describe the spiral reverse bandage of the leg.* The bandage is started by making one or two figure-of-eight turns around the ankle and then making ascending turns up the leg. These turns are applied in the same manner as a regular ascending turn with this difference: as the roller is brought around the limb, it is turned so that the inner side of the bandage becomes the outer and the outer side becomes the inner. These reverse turns must be made evenly and over the fleshy part of the leg so that no irritation results.
46. *What principles must be observed in the selection and care of instruments?* There is a gradual tendency to standardization of instruments, and as this progresses, manufacturers are giving more thought to quality and temper. It is essential that the steel of the instruments, especially the cutting edges, be well tempered so that they can be sharpened and retain their keen edges. The handles should be of steel or aluminum or some other metal that can be easily boiled. Instruments which are mounted in other than metal handles cannot be sterilized by boiling and should not be used. Instruments should be polished at regular intervals as continued sterilizing will cause them to stain and after a time they do not look presentable.
47. *What is a hone?* A hone is a smooth block of fine stone which is used for sharpening instruments. There are several kinds of hones, the best of which for chiropody purposes is the Belgian hone. A hone should be soft so that the blade of the instrument can take hold when drawn across its surface, but should not be rough and gritty.
48. *What is a strop?* A strop is a piece of leather, usually horsehide, mounted on a piece of wood and is used for straightening and smoothing the edge of an instrument after honing or after cutting. The leather is smooth and soft enough to allow the steel of the instrument to compress it when being passed over its surface.
49. *Define a shield.* A shield is an appliance made of some soft material and used to protect a part from pressure or friction.
50. *What materials are generally used for shielding?* The materials generally used for shielding are felt, chamois, buckskin, moleskin, and lamb's wool.
51. *Describe the felt used for shielding.* The white wool piano felt of soft texture is best for shielding and varies in thickness from 1/16 inch to 1/2 inch. The thin felt is used for small shields on and between the toes and the thick material is used for the great

toe joint and for pads for the arches of the foot. Pure wool felt can be easily skived and fitted, but when mixed with cotton it loses its firmness and is easily pulled out of shape. The latter is used for padding the arches only.

52. *Describe chamois.* Chamois is an ideal shielding material where thick shields are not required. The material is soft and pliable and is suitable for shields between the toes.
53. *Describe buckskin.* Buckskin is one of the most popular materials used for shields. The skin has good body and can be skived very thin without losing its firmness. The thickness of buckskin varies sufficiently to permit its use in nearly all parts of the foot.
54. *Describe moleskin.* Moleskin is an adhesive plaster made on a cloth which is thin yet it has good body and does not lose its shape or stretch when used. Because of its thinness and texture it requires no skiving and is ideal where thin shields are indicated.
55. *Describe lamb's wool.* Lamb's wool is really not a shielding material, but is used in the sole of the shoe to act as a cushion for the plantar surface, in painful callosities, and other plantar troubles.
56. *What fundamentals must be observed in making and fitting shields?* The fundamental principles of shielding are: (1) the location of the area to be protected so that the size and shape of the shield can be determined; (2) the thickness of the shield, which must not be too thick or too thin; (3) the skiving, so that pressure is evenly distributed away from the area to be protected; (4) the aperture, which must be of the proper size and shape so as to permit the rest of the shield to act as a protective; (5) adhering the shield so that slipping and irritation are prevented.
57. *Describe skiving.* Skiving is a process by which the edges of a shield are cut away to a feather edge. This is accomplished by the skiving knife, which is a fairly large blade which tapers toward the front of the knife. A shield is skived after it has been cut to the proper size and shape; the material is placed on a smooth surface (a skiving board is sold for this purpose) and the edges of the shield are thinned by cutting around its entire area, until a uniform bevel is obtained.
58. *What fundamentals must be observed in strapping a shield?* When a shield is strapped to any part of the foot the following must be observed: (1) the strapping must not be applied too tightly, remembering that the foot being strapped is at rest and that under weight bearing the tissues expand; (2) allowance should be made for swelling, especially on the toes, so that straps should not completely encircle a toe that is inflamed and which may therefore swell; (3) the edges of the shield should be covered as much as possible with the adhesive plaster, which prevents the shield from being raised from the skin during normal motions of the foot; (4) the ends of the plaster should be cut round, which

will prevent loosening at the edges. It has been found that adhesive plaster will loosen more readily when allowed to have sharp angulated corners.

59. *What is local anesthesia?* Local anesthesia is insensibility to pain brought about in a given area by means of agents called local anesthetics.
60. *How is local anesthesia classified?* Local anesthesia is classified into (a) hypodermatic injection, (b) freezing.
61. *Describe hypodermatic injection local anesthesia.* This method of inducing local anesthesia is accomplished by the use of the hypodermic syringe and is divided into two subdivisions: (a) infiltration and (b) conductive anesthesia.
62. *Describe infiltration anesthesia.* This form of local anesthesia is used most and consists of carefully and thoroughly infiltrating the area to be operated upon with the anesthetic agent. All of the tissues are saturated so that all of the sensory nerves contained therein are acted upon by the fluid.
63. *Describe conductive anesthesia.* This form of local anesthesia, also called nerve blocking consists of injecting into or around a nerve trunk. When the fluid acts upon the nerve fibers it causes a loss of sensation from that point to the periphery. Injection into the trunk is called endoneural anesthesia and injection around the trunk is called perineural anesthesia. The former is difficult of attainment unless the nerve trunk is exposed by first cutting down on it. The latter is most practical, especially when the anatomy of the parts is thoroughly understood, and with sufficient practice, becomes quite simple.
64. *What is the advantage of conductive anesthesia over infiltration anesthesia?* The former method causes loss of sensation over larger areas and is to be preferred when extensive incisions are to be made. When the operation is limited, infiltration is to be preferred.
65. *What period of time must elapse before operation after inducing local anesthesia?* If infiltration is used and is thoroughly done, the operation can be started almost immediately. With conductive anesthesia, if injection is made directly into the nerve trunk, the effect is also immediate. With perineural injections, the time varies with the size of the trunk around which injection has been made. The larger the trunk and the thicker the fibrous covering around it, the longer it will be necessary to wait until anesthesia is complete. Sometimes it is necessary to wait even for twenty minutes to a half hour before commencing to operate.
66. *Describe local anesthesia by freezing.* This method depends on the rapidity of evaporation of certain drugs. When any liquid evaporates it extracts heat from surrounding bodies. The more rapid the evaporation the more heat will be extracted. Thus, if the evaporation takes place on the skin, the heat will be taken



from this structure and if sufficiently intense, freezing will result. Ethyl chloride is the best substance to use for this form of anesthesia and should be sprayed immediately over the area to be operated. When the area turns white and frosted, sensation to pain is lost.

67. *When is freezing indicated as a local anesthetic?* Freezing should only be used when the operative procedure is slight, such as in the incision of an abscess. It should not be used in extensive work, as its effects are limited, and too much freezing will bring about an inflammatory reaction which may terminate in the destruction of tissue.
68. *What drugs are used for hypodermatic injection as local anesthetics?* The drugs most commonly used for this purpose are cocaine, novocaine, alypin, quinine and urea hydrochloride, etc. Novocaine is the best agent to use as it is safer than cocaine and a better anesthetic than the others.
69. *What strength solution of novocaine is usually employed?* For infiltration anesthesia, one per cent. is sufficient and for conductive anesthesia, two per cent will suffice.
70. *How should a solution of novocaine be prepared?* The solution should be prepared by dissolving the novocaine in a sterile physiologic salt solution, and the solution boiled. This makes a solution which is isotonic and thus more agreeable to the tissues and more readily absorbed by them. Ampoules of novocaine can be secured which are prepared in this manner and which are sterile. After the outside of the ampoule has been sterilized, it is ready for use.
71. *What technic is employed in preparing the hypodermic syringe?* The entire apparatus is first sterilized by boiling in water, and when cooled, the needle is put in place and the solution drawn up into the barrel of the syringe. The syringe is then turned needle upward and all the air expelled by pressing on the piston. If air should be injected into a blood vessel it might cause death. When all the air has been excluded, the apparatus is ready for use.
72. *What is an heloma?* An heloma, corn, clavus, or horn is a circumscribed overgrowth of the epidermis, with a central core or radix which presses down upon the derma.
73. *How are helomata classified?* Helomata are classified according to their appearance, texture, or composition as (a) heloma durum or hard corn; (b) heloma molle or soft corn; (c) heloma vasculare or vascular corn; (d) heloma miliare or seed corn.
74. *Define heloma durum.* Heloma durum is a hard circumscribed overgrowth of the epidermis usually found on the outer side of the fifth toe, the dorsum of the three middle toes, and on the plantar surface of the great toe.
75. *What are the symptoms of heloma durum?* The patient complains of sharp pains in the toes when the shoes are worn which increases



when the weather is about to change. There is a mass of horny, epithelial cells of a characteristic yellow color which is separated from the surrounding skin by a sharp line of demarcation. Within the growth and usually in the center is a darker, more compact mass called the radix or nucleus. The surrounding skin is somewhat congested.

76. *What is the etiology of heloma durum?* Heloma durum is caused by intermittent friction or pressure of ill-fitting shoes. The shoes may be too tight or they may be too loose. Helomata dura on the plantar surface of the foot are caused by some roughness in the sole of the shoe or by downward displacement of one or more of the heads of the metatarsal bones.
77. *What is the pathology of heloma durum?* The pathology of heloma is mostly morphologic. Leading up to the formation of the heloma there is first an excitation of the cutaneous nerves which causes an afflux of blood. This increase of blood supply dilates the vessels and increases the nourishment to the skin. There is a consequent over-production of skin cells and as the cells crowd upward they soon form a mass which is known as a callosity. Usually at the center the crowding is more marked and the cells form concentrically to form the radix. As this portion continues to become larger it takes the shape of a cone, the apex of which points downward into the derma.
78. *What is the prognosis of heloma durum?* The prognosis of heloma durum is uncertain. Some helomata disappear after a single treatment while others continue to return even after years of regular attention.
79. *Why do helomata dura recur after being removed?* There are two factors responsible for this recurrence. The shoe which caused the heloma continues to be worn and after a time the blood vessels below and around the corn become permanently enlarged so that the growth continues even if the style of shoe be changed and proper treatment be given.
80. *How is the treatment of heloma durum classified?* The treatment of heloma durum is divided into three groups: (a) non-operative, (b) non-radical operative, (c) radical operative.
81. *Describe the non-operative treatment of heloma durum.* This form of treatment is a palliative method and consists of the use of chemical agents which desiccate the growth. The agents usually employed for this are silver nitrate and salicylic acid. The latter is the most popular and is used in an ointment, 25 per cent., put into the aperture of a shield and allowed to remain for three or four days. When the dressing is removed, the skin will be white and soft and is easily peeled off the toe. This is repeated as often as is necessary to remove the entire growth.
82. *Describe the non-radical operative treatment of heloma durum.* This procedure is the one practiced by practitioners of chiropody

and consists of removing the overgrown epidermis and dissecting out the radix. This is done in one of two ways: (a) shaving, in which the growth is removed piece by piece either by the knife or chisel; (b) dissection, in which the corn is removed in one piece by specially made chisels.

83. *Describe the radical operative treatment of heloma durum.* This procedure is directed not alone against the growth itself but also against the enlarged blood vessels under and around the corn. Local anesthesia by novocaine, 1 per cent., is secured and then a semi-elliptical incision is made around one side of the corn. The tissues are dissected from under and a second semi-elliptical incision is made, meeting the first and completing the ellipse in the center of which is the growth. When all of the underlying tissue has been freed, the entire mass is removed and the resultant wound is sutured by interrupted sutures.
84. *What is the treatment for a suppurating heloma durum?* The toe will appear red and swollen and when the outer layers of the epidermis are removed, pus will exude from the lesion. All of the epidermis is cut away, and a wet dressing of mercuric chloride (1:5000) is applied for one or two days. When drainage of pus is not rapid enough, it may be helped by increasing the size of the wound by incision. When the infection has cleared up, the part is dressed with a suitable shield and in the aperture may be placed a healing ointment. A desirable remedy for lesions of this kind, which are painful, is the compound parathesin ointment which will relieve pain as well as help healing.
85. *Define heloma molle.* Heloma molle, or soft corn, is a soft, white, macerated growth found between the toes, principally in the web between the fourth and fifth toes and on the lateral sides of the interphalangeal joints of the toes.
86. *What are the symptoms of heloma molle?* The pain varies with the degree of pressure brought to bear on the toes. The patient will complain of something annoying, like a foreign body such as a pebble, and as the growth becomes larger, this becomes worse. Examination shows a white macerated mass of epidermis with a sharp line separating it from the normal skin. The lesion is superficial and the radix is shallow.
87. *What is the etiology of heloma molle?* Heloma molle is also caused by improper shoes, but here the shoe is an indirect factor, Crowding of the toes by the shoe causes the opposite heads and bases of the bones to be pressed against each other with an impingement of the skin between them. The skin is thus irritated and the overgrowth begins. The normal function of perspiring continues and with the crowding, evaporation is impossible. Thus the moisture, which is acid in character, accumulates and acts upon the skin, causing it to become white, soft, and macerated.
88. *What is the pathology of heloma molle?* The morphologic changes accompanying the formation of heloma durum are again mani-

fested, except that the growth is not so deep seated. Inflammation terminating in suppuration is often encountered, due to the action of the perspiration which may produce small fissures which permit the bacteria to enter the tissues.

89. *What is the prognosis of heloma molle?* Heloma molle, properly treated, will respond and clear up. A careful analysis of the cause must be made and treatment directed against the etiologic factors.
90. *What is the treatment of heloma molle?* The treatment of heloma molle is divided into (a) non-radical surgical, (b) therapeutic.
91. *Describe the non-radical surgical method of treating heloma molle.* The footgear, both shoes and stockings, must be corrected to "stop crowding of the toes. With specially made instruments, the golf stick" and the soft corn spoon, the thickened mass of skin is carefully cut away and the radix carefully dissected out with a small pointed knife. When all of the growth has been removed, a shield is applied and if the part is irritated, a soothing ointment may be placed in the aperture.
92. *Describe the therapeutic treatment of heloma molle.* Two drugs find great favor for the treatment of heloma molle. They are salicylic acid and silver nitrate. Salicylic acid is used in an ointment, 25 per cent., and is allowed to remain for four or five days. After that time, the skin can easily be peeled away. Silver nitrate is used in a 25 or 50 per cent. solution, applied every other day. This hardens the skin before it peels off.
93. *Of what importance is shielding in the treatment of heloma molle?* Shielding is the most important phase of the treatment of heloma molle. The separation of the toes and the proper alignment of the bones will do the most toward curing the condition. When the helomata appear on the lateral sides of the toes, an oval shield suffices. When the growths appear in the web of the fourth and fifth toes, then the "duck shield" should be used. This shield will keep the toes apart and will also raise the head of the fourth metatarsal bone which has dropped and is rotated outward. These with proper footgear will bring about a cure.
94. *Define heloma vasculare.* Heloma vasculare is an overgrowth of the epidermis in which enlarged and elongated blood vessels are found.
95. *What are the symptoms of heloma vasculare?* The growth is usually found on the plantar surface of the foot, but it may develop in old helomata dura or callouses on the outer aspect of the fifth toe. Pain is more severe than in other forms of helomata, especially a burning sensation when the foot is at rest. It appears the same as heloma durum except that dark red spots are seen scattered throughout it. These bleed when cut and are not to be confused with blood clots sometimes found in heloma durum as a result of injury.

96. *What is the etiology of heloma vasculare?* The overgrowth of the epidermis is caused by the same factors as in heloma durum, the blood vessels being forced into the epidermis by lateral pressure of the shoes or by the pinching of tight stockings. The normal papillae are usually very long at the seat of heloma vasculare, thus making them more easily forced into the epidermis.
97. *What is the pathology of heloma vasculare?* There is an overgrowth of the cells of the epidermis but there is no increase in connective tissue or in the number of blood vessels as in verruca. The blood vessels leave the papillary layer of the derma and enter directly into the epidermis without affecting the surrounding connective tissue. There is a limited amount of inflammation, but this rarely terminates in suppuration.
98. *What is the prognosis of heloma vasculare?* The prognosis is good if treatment is thorough. There may be a recurrence of heloma durum, but the vascular lesion, once eradicated, should not return.
99. *What is the treatment of heloma vasculare?* The treatment is divided into (a) surgical, (b) medicinal, (c) mechanical.
100. *What is the surgical treatment of heloma vasculare?* The surgical treatment consists of an operation much the same as the radical surgical treatment for heloma durum. The part is anesthetized and two semi-elliptical incisions are made around the growth which meet to complete an ellipse. The tissue is then dissected out and the resultant wound sutured.
101. *What is the medicinal treatment of heloma vasculare?* The medicinal treatment consists of the use of various chemical agents which gradually destroy the growth and terminates in an ulcer. (See treatment of verruca for details.)
102. *What is the mechanical treatment of heloma vasculare?* The mechanical treatment of heloma vasculare consists of the use of electricity in its various forms for the cure of this condition. (The treatment of heloma vasculare is much the same as the treatment of verruca; see that subhead for details.)
103. *What is heloma neurofibrosum?* Heloma neurofibrosum or neurofibrous corn is an heloma in which there are found enlarged nerve endings. This condition is much like heloma vasculare structurally, except that the nerve terminals instead of blood vessel loops have been involved. They are extremely painful and great care is necessary when operating upon them unless local anesthetics be used. They are found on the inner plantar edge of the great toe and on the outer plantar edge of the fifth toe. It is at this point that the size of the papillae change from short ones on the dorsum to long ones on the plantar and this point is subjected to irritation more easily than when the size of the papillae is uniform.
104. *What is the treatment of heloma neurofibrosum?* The treatment is

the same as for heloma vasculare except that agents which cause pain must not be used. Procedures requiring local anesthetics are preferred.

105. *Define heloma miliare.* Heloma miliare or heloma disseminatum or seed corn is a small excrescence found on the plantar surface of the foot, usually in large numbers and most often seen around the heel. The growth is about the size of a millet seed.
106. *What are the symptoms of heloma miliare?* The patient does not suffer the pain caused by other forms of helomata, and only when the lesions appear in great numbers do they become painful. A peculiar sensation is felt as if there were a foreign body in the shoe. Examination will reveal several small helomata which appear to be all nucleus.
107. *What is the etiology of heloma miliare?* When the surface of the sole of the shoe becomes roughened by nails protruding or by the insole becoming wrinkled, heloma miliare may develop. Stockings that have been poorly mended are also factors. Persons with dry skin are prone to this lesion and this factor is often responsible for large clusters of growths.
108. *What is the pathology of heloma miliare?* Hypertrophy of the epidermis occurs over a very limited area so that the growth appears to be all radix. The area surrounding is not involved except that it might be slightly congested. The papillae between the growths are normal.
109. *What is the prognosis of heloma miliare?* Careful operation and intelligent after-care will bring about a cure in a few treatments. The etiologic factors must be removed.
110. *What is the treatment of heloma miliare?* The treatment of heloma miliare may be surgical or medicinal. The growths may be carefully dissected out, but in cases where the lesions are very numerous and appear in clusters, it is simpler to treat them with salicylic acid. Adhesive plaster containing 25 per cent. of this drug can be purchased and a piece cut the size of the cluster and placed directly on the skin. It is allowed to remain in place for four or five days when it is removed and the lesions may be easily taken out. The skin, if dry, should be treated by instructing the patient to rub lanoline into it at least every other day. This will supply the oil that is lacking in the skin and help to keep its texture normal.
111. *Define callositas.* Callositas, callouses, callosity, tyloma or tylosis is a thickening of the epidermis usually found on the plantar surface of the foot. This thickening may occur on any part of the body which is subjected to irritation. Thus, coachmen have callouses between their fingers because of the manner in which the reins are held. Mechanics using hand tools develop callouses on the hands.



112. *What are the symptoms of callositas?* The symptoms of callositas are characteristic. Pain is not marked unless helomata develop within the lesion. The lesions appear as variously sized areas of thickened epidermis of a grayish color and which is thickest in the center, gradually becoming thinner at the periphery. There is no sharp line separating the lesion from the normal skin such as is seen in heloma.
113. *What is the etiology of callositas?* A callosity is the result of some form of mechanical irritation and the growth develops primarily as a protective to the more delicate structures beneath the skin. The outer layers of the epidermis become thicker as the irritant becomes more severe. Callouses may result from chronic skin diseases such as eczema, psoriasis, etc.
114. *What is the pathology of callositas?* The changes that occur in the formation of callositas are much the same as in heloma, except that the deeper layers of the epidermis and the true skin are not so much involved. There is no inflammation unless there has been accidental injury or infection. The outer layers of the epidermis only are affected and the condition is more physiologic than pathologic. The overgrowth may continue to a great extent and even helomata may develop within the callosity.
115. *What is the prognosis of callositas?* The removal of the irritant will usually suffice to bring about a cure. In callositas on the sole of the foot, changing the shoe and correcting the foot condition present will affect a cure.
116. *What is the treatment of callositas?* The thickened epidermis requires no special treatment unless it becomes thick enough to cause discomfort. This is accomplished by softening the skin and then scraping or paring it with a knife. Chemicals can also be used to disintegrate the mass and salicylic acid ointment, 25 per cent., or potassium hydroxide, 5 per cent., are most often used. Too much of the skin should not be removed as it will leave the part very sensitive. If this should occur, moleskin adhesive plaster should be applied as a protective. To effect a permanent cure of the callosity requires that the cause be permanently removed. Thus, if a bone is out of alignment it must be corrected or if the shoe is at fault it must be changed.
117. *Define verruca.* Verruca, sometimes called papilloma, is a benign or innocent tumor of the skin, both the derma and epidermis. It is a neoplasm in which there is an overgrowth of all of the skin structures, especially the blood vessels.
118. *Where do verrucae occur?* Verrucae occur on the feet, hands, and face.
119. *How are verrucae found on the foot classified?* Verrucae found on the foot are classified as (a) verruca arida or dry wart, (b) verruca humida or moist wart.
120. *What is verruca vulgaris?* Verruca vulgaris is that form of



growth which appears on the hands and is really a type of *verruca arida*.

121. *What is the etiology of verruca?* There is no definite etiology. At one time it was supposed to be caused by a microorganism, but no definite results were ever obtained in the attempt to isolate the offending microorganism. Trauma as a factor seemed to have more status, for often these growths appear in the skin after injuries. The latest and perhaps the most scientific work done in determining the cause of verruca has shown that a filterable virus, extracted from a wart, when injected into the skin, will produce similar lesions.
122. *What is the pathology of verruca?* There is an overgrowth of the true skin covered with a thickened epidermis. The surface of the growth may be smooth or it may have a cauliflower appearance. The lesion may be elevated or it may be flattened to the level of the surrounding skin. The blood vessels contained therein are greatly enlarged, and there is hypertrophy of all the connective tissue structures. A vertical section shows a branching arrangement of the vessels, each with a connective tissue framework and an epithelial covering.
123. *Describe verruca vulgaris.* *Verruca vulgaris* appears on the hands and arms, and affects children more often than adults. The growths often appear in large numbers and seem to occur spontaneously. The lesion is round and elevated and looks like a cauliflower. Early in its formation it has the same color as the surrounding skin, but later it becomes darker. It causes no pain, but bleeds readily when injured.
124. *Describe verruca arida.* *Verruca arida* appears on the sole of the foot, over the metatarsals and at the ends of the toes. It is flattened and is covered with a heavy callous. This latter is due to the pressure to which the growth is subjected when the patient stands and walks.
125. *Describe verruca humida.* *Verruca humida* is usually found on the inner aspect of the plantar surface of the heel and between the toes. It is soft and spongy and has a sharp line of demarcation separating it from the surrounding skin. The center is white and crater-like. Occasionally it is covered with a layer of soft callous, resembling *heloma molle*.
126. *What is the diagnosis of verruca?* *Verruca* can be recognized by the characteristic cauliflower-like appearance, but on the plantar surface, where this is lost, it is distinguished by the fact that it bleeds readily when cut and when the superficial callous has been removed, its limited extent is recognized. *Verruca* may be confused with epithelioma, a malignant tumor, but a careful history of the case, plus its appearance will make a diagnosis possible.
127. *What is the prognosis of verruca?* Some verrucae disappear spontaneously, but those which appear on the sole of the foot persist

and are very painful unless treatment is given regularly and thoroughly.

128. *What is the treatment of verruca?* The treatment of verruca is varied. There are six approved methods of treatment: (1) potential cautery, (2) excision, (3) fulguration, (4) electrolysis, (5) direct cautery, (6) carbon dioxide pencil.
129. *Describe potential cautery.* Potential cautery consists of the use of chemical agents which destroy the growth. Nitric acid, acetic acid, monochloroacetic acid, trichloroacetic acid, salicylic acid, silver nitrate, potassium hydroxide, sodium hydroxide, and pyrogallol acid are some of the agents used. The technic is much the same for all of the drugs with the exception of salicylic acid. The agent selected is applied every other day, the eschar or crust being removed before each application. When the entire growth has been destroyed, a suppurating area will be found beneath the eschar. This latter is treated by any healing stimulant. Salicylic acid is applied in a 60 per cent. ointment and allowed to remain for a week. Then the procedure is as above.
130. *Describe excision.* Local anesthesia with novocaine, 1 per cent., is first induced, and then an incision is made half way around the lesion. This is called a semi-elliptical incision and is made into the derma and down to the adipose tissue. Another such incision is made on the other side of the growth, thus completing an ellipse. The entire structure between the two incisions is then dissected out and the resultant wound is closed by a few interrupted sutures which are removed within a week or ten days.
131. *Describe fulguration.* Fulguration is an electric method in which the concentrated spark of a high-frequency coil is applied over the verruca until it is all white in color. The crust is removed in a few days, and the application of the spark continued until the lesion is destroyed. Fulguration with diathermic current is also used but this method is dangerous unless the apparatus is well understood and it further requires the injection of local anesthetics. The spark from an Oudin coil is best for the former method of fulguration.
132. *Describe electrolysis.* This too is an electric method and consists of the application of the negative pole of the galvanic current to a needle which is passed into the tissues under the growth. The positive pole is attached to an electrode at a point on the body near the seat of operation. The current is then turned on and soon hydrogen bubbles appear around the needle. When bubbling is well marked the current is turned off and the needle removed. If there has been sufficient electrolysis, the growth will dry up and fall off in a few days.
133. *Describe direct cautery.* This method consists of the use of a very hot substance, preferably a piece of metal, which is applied to the growth, destroying it by actual contact with heat. Platinum cautery knives can be secured which can be heated by attachment

to a small electric coil and which are very efficient for this method. Some practitioners use glowing carbon for cautery.

134. *Describe the carbon dioxide pencil.* This method causes destruction of the part by freezing. Liquid carbon dioxide is permitted to escape into a glove-finger or other suitable receptacle where it solidifies. This solid mass, called a pencil, is then placed over the growth for a few minutes which completely devitalizes the area. In a few days the growth will slough off and the resultant ulcer is then treated by the use of antiseptic stimulants. These ulcers are often painful and can be relieved by the use of the compound parathesin ointment.
135. *Define calloused nail groove.* A calloused nail groove is a condition in which there is a thickening of the epidermis of the lateral nail groove with or without formation of helomata.
136. *What are the symptoms of calloused nail groove?* The patient complains of pain on slightest pressure and in severe cases throbbing and heat are also manifested. The lateral nail fold is usually red and swollen and examination will reveal the thickened skin and helomata. The nail presses against the soft tissues but is not embedded therein.
137. *What is the etiology of calloused nail groove?* The condition may be caused by irritation of the nail fold by the patient persisting in treating the edges of the nail with some instrument. The usual etiologic factor is a short or narrow shoe or stocking. The improper footwear causes the soft tissues of the nail fold to be forced against the lateral edge of the nail and the callous results as a protection to prevent the nail entering the tissues. The helomata are caused by localized pressure of a sharp corner of nail.
138. *What is the treatment of calloused nail groove?* There are various methods of treatment for the relief or cure of this painful condition and are divided into: (a) surgical, (b) medical.
139. *Describe the surgical treatment of calloused nail groove.* This method consists of removing the callous by means of a gouge, pointed scalpel, or curette. The skin may first be softened by the application of pledgets of cotton saturated with liquor potassae. The nail should only be cut when there is insufficient room to operate, and then only a small portion of the edge is removed. The surgical method of treating calloused nail groove is used with some success, but the amount of skill required to successfully do this is such that the use of local medical applications is preferred.
140. *Describe the medical treatment of calloused nail groove.* There are two drugs that find great favor in the treatment of this condition and they are salicylic acid and liquor potassae (potassium hydroxide, 5 per cent.). The former drug is used in the ointment form, about 15 to 25 per cent., which is placed in the nail groove and covered by a cotton packing. This is permitted to remain for a week when the groove will be found to be white and soft and

the callous easily removed with an excavator. Liquor potassae is used where the callous is general rather than where there are helomata. An applicator is saturated with the solution and is then rubbed over the calloused area until it is softened, when it may be easily removed. Both these methods can be combined with the surgical treatment and it depends entirely on the judgment of the operator which is to be preferred.

141. *Define ingrown toe nail.* Ingrown toe nail or onychocryptosis is a condition in which the lateral edge of the nail has penetrated through the epidermis of the nail groove and has become embedded in the adjacent soft tissues.
142. *What is the etiology of ingrown toe nail?* The cause of ingrown toe nail is mostly injudicious cutting of the nail by the patient plus lateral pressure of the shoe against the nail fold. The amateur cutting of the lateral edge of the nail, produces sharp points or shoulders which readily cut into the skin of the nail groove when pressure is sufficient.
143. *What are the symptoms of ingrown toe nail?* The lateral side of the toe is red and swollen and the patient suffers intense pain, especially when pressure is exerted against the soft tissues or downward on the nail plate. Proud flesh or superfluous granulations are seen protruding above the groove and pus exudes from the wound.
144. *What is the pathology of ingrown toe nail?* The nail entering the tissues acts as a foreign body and thus causes the usual inflammatory reaction found wherever foreign bodies become lodged in the tissues. The usual terminus is suppuration and subsequent formation of scar tissue. Granulation tissue forms in the attempt to heal the wound and the nail being interposed causes this structure to pile up in a mass which appears pink or red and is highly vascular.
145. *What is the prognosis of ingrown toe nail?* The prognosis is favorable even with palliative operations, provided after-treatment is carried on for a sufficient length of time. When there has been repeated recurrences, and the tissues of the nail flap have become hardened by scar tissue, nothing but a radical operation will bring about a cure.
146. *What is the treatment of ingrown toe nail?* The treatment of ingrown toe nail is divided into (a) non-operative, (b) non-radical operative, (c) radical operative.
147. *Describe the non-operative treatment of ingrown toe nail.* This procedure is utilized only in incipient cases and consists of forcing the soft tissues back from the offending portion of nail and keeping them back by packing with sterile gauze. Some practitioners use this procedure in combination with astringents, especially the iron salts.
148. *Describe the non-radical operative treatment for ingrown toe nail.* Asepsis is practiced and then the portion of the nail that has

become embedded is removed with a chisel, the nail being cut from the distal end diagonally backward to the lateral free edge. It should not be cut straight back to the root of the nail. When the nail is removed, the groove is lightly packed with sterile gauze and the toe bandaged. Wet dressings of bichloride of mercury (1-5000) or of Burrow's solution are applied for two days and if all drainage has ceased, the wound is dressed with an antiseptic stimulant, usually in ointment form. Proud flesh is destroyed by either snipping off with the scissors or by cautery with silver nitrate (50 per cent.). After the wound has healed the nail groove must be packed at regular intervals until the nail has grown completely out of the lateral fold. This part of the treatment is most important to prevent recurrence as it forces the soft tissues back to their normal position. Proper footgear must be worn and unless the patient is willing to change the style of shoe and stocking recurrence will follow.

149. *Describe the radical operative treatment of ingrown toe nail.* This form of treatment should only be used when non-radical measures have failed. There are several operations all of which seek to eliminate either the offending soft tissues or destruction of a limited portion of the nail matrix under the ingrown nail. Whether one or the other procedures is used, the work must be thorough. If the nail flap is removed it must be done completely and if the nail matrix is to be destroyed, it is better to dissect it away rather than to curette. Local anesthesia must be used in all radical operations for ingrown toe nail.
150. *What is onychia?* Onychia, or onychitis, is an inflammation of the nail matrix with suppuration and final shedding of the nail.
151. *What is the etiology of onychia?* Onychia is caused mostly by bacterial infection. It may also be caused by trauma causing injury to the nail and subsequent inflammation of the matrix. Improper and septic treatment of ingrown toe nail may also cause the condition. Syphilis, tuberculosis, and eczema are also etiologic factors.
152. *What is the pathology of onychia?* Either bacteria or trauma causes the matrix of the nail to become inflamed and with it are all the pathologic changes that accompany inflammation. There is a gradual solution of continuity of the nail and its attachment at the matrix, and as suppuration continues, the tissues are destroyed and the mechanical union of the nail and the matrix is lost. The nail then falls off. If the entire matrix is destroyed during the suppuration, no nail will grow again, but usually there is a partial destruction of the matrix only, which results in malformation of the new nail.
153. *What are the symptoms of onychia?* There is severe pain when pressure is exerted on the nail plate. The nail bed and grooves are involved and the inflammation may continue to such an extent as to destroy large areas of tissue. Pus forms at the root of the



nail and the posterior portion of the nail plate becomes loosened from the bed. When the etiology is bacterial or traumatic, one or perhaps two toes may be involved. If the cause be systemic, all of the nails, including those of the hands are usually affected.

154. *What is the treatment for onychia?* The pus must be drained and the nail must be removed in part or entirely to accomplish this. Wet dressings of bichloride of mercury (1:5000) are used and when drainage is complete the parts must be protected from further irritation either by the shoe or by the remaining nail. The soft tissues must be kept separated from the nail by packing with sterile gauze. Severe cases often require extensive surgical interference.
155. *Define paronychia.* Paronychia, paronychitis, felon, panaris or whitlow is an inflammation of the tissues around the nail and may involve all of the structures of the distal phalanx including the bone.
156. *What is the etiology of paronychia?* Paronychia is due to bacterial infection from unclean instruments, or it may be of systemic origin. It often is associated with onychia in which the inflammation has spread. An ingrown toe nail may also terminate in paronychia.
157. *What is the pathology of paronychia?* All of the signs of inflammation are present and pus usually is found in the posterior nail fold. Tissue destruction is rapid unless proper treatment be given and the bone is often involved producing osteitis or peritonitis.
158. *What are the symptoms of paronychia?* Inflammation with its clinical signs is present to a greater or lesser degree and the patient complains of throbbing pain which affects the entire toe. There is a red line which runs around the posterior nail fold and continues up the sides of the lateral grooves.
159. *What is the treatment of paronychia?* The treatment of paronychia is much the same as for onychia. The pus must be drained and incision is usually made through the posterior nail fold. Wet dressings are used until the drainage has ceased and the wound is then dressed with an antiseptic ointment. White precipitate is a valuable drug in this type of wound and should be used with or without parathesin depending on the degree of pain.
160. *Define onychauxis.* Onychauxis or hypertrophy of the nail is an overgrowth or enlargement of the nail. When the nail becomes deformed or grotesque in shape the condition is called club nail or onychogryphosis.
161. *What is the etiology of onychauxis?* The nail becomes enlarged as a result of enlargement of the papillae of the nail matrix. Pressure is often responsible and injury to the matrix will often terminate in club nail. Chronic skin diseases such as eczema, psoriasis, and diseases like syphilis, gout and rheumatism, and



nerve diseases or injury to the nerves will act as causes for onychiauxis.

162. *What is the pathology of onychiauxis?* Pressure or injury causes a widening of the nail fold which permits the nail to grow thicker. The nail is irritated and a horny mass forms on the bed which, in turn, acts as a barrier to the normal forward movement of the nail cells. The papillae of the matrix become enlarged and may be seen protruding above the normal structure when the nail is removed.
163. *What is the treatment of onychiauxis?* The cause must be determined and if it is systemic, treatment must be directed against this by the physician. For onychiauxis caused by local agents, treatment is either palliative or radical. The former consists of keeping the nails as near normal as possible by cutting and filing with the surgical drill. Radical measures are used on club nails that are extremely painful and in which palliative measures give no relief. The nail is removed and that portion of the matrix which is still vital is destroyed by dissecting it away or curreting.
164. *Define onychatrophia.* Onychatrophia or atrophy of the nails is a condition in which the nails become smaller, streaked, and brittle and are often shed from the grooves.
165. *What is the etiology of onychatrophia?* Atrophy of the nails may be caused by one of many factors among which are the inflammatory skin diseases; nervous diseases, constitutional disorders, and injuries. Injury to the nail matrix causes complete or partial cutting off of nourishment. In wasting diseases such as tuberculosis, nephritis, and diabetes mellitus, the matrix is usually under-nourished and the nails become soft and brittle. Chemical poisons such as arsenic, silver, and lead may cause atrophy of the nails.
166. *What is the pathology of atrophy of the nails?* When the nourishment of the matrix has been interfered with, the cells do not develop as rapidly as normal and the nail becomes thin and streaked. The luster is lost and the nail becomes gray or yellow and often brittle. Infections at the matrix cause destruction of the matrix by solution, which, in turn, produce complete or partial loss of nail. White spots (leuconychia) seen under the nails are said to be caused by air under the nails.
167. *What is the treatment of onychatrophia?* If the cause is systemic, local treatment is of little avail. Local treatment consists of protection and the use of stimulants to induce nail growth. Cocoon dressings under which pure balsam of Peru is used, is found of value. The nails must be properly cut and smoothed with the file.
168. *Define fissures.* Fissures are cracks or clefts in the surface of the skin which may involve the epidermis and also the derma.
169. *What is the etiology of fissures?* Fissures may be caused by

trauma, but the usual causative factors are hyperidrosis, uric acid diatheses, and other systemic conditions. The skin between the toes becomes weakened and irritation due to drying the skin with a rough towel or the presence of a foreign body between the toes will cause it to crack. Fissures may also be produced in spreading the toes too far apart, and chiropodists in working between the toes are often responsible for this.

170. *What are the symptoms of fissures?* The patient complains of a burning pain between the toes. The skin is red and there is a crack or fissure in the skin. This may be superficial or it may be deep.
171. *What is the treatment of fissured toe webs?* Superficial fissures are treated by painting compound tincture of benzoin over the parts. Dusting powders such as thymol iodide, tannoform, etc., are also used. Deep fissures require more care, however, and silver nitrate is the drug that is most efficient. The strength solution varies from 10 per cent. to as high as 50 per cent., depending upon the condition of the fissure. The lesion must be thoroughly cleansed before any medication is used. Tincture of iodine followed by silver nitrate has been used with success, the reaction of the drugs producing silver iodide which heals the fissure. If proud flesh is a complication, this should be snipped off or cauterized with a strong solution of silver nitrate.
172. *Define blister.* A blister or bulla is a collection of fluid which causes an elevation of the outer layers of the epidermis, the base being formed by the rete.
173. *What is the etiology of blister?* Trauma is the most common cause of blister and those met in chiropody are caused by friction of ill-fitting shoes. Blisters may also occur in connection with certain skin lesions or in burns.
174. *What is the pathology of blisters?* The pathology of traumatic lesions is simple. The friction causes a loosening of the layers of the epidermis and further, the irritation causes a serous exudation from the blood stream into the lower layers of the rete. The fluid collects and further loosens the upper layers of the epidermis. If the trauma is severe, occasionally a blood vessel will rupture and its contents will enter the epidermis, causing a "blood blister."
175. *Where are blisters usually found on the foot?* The most common site of blister is on the posterior portion of the heel over the tendo Achillis. Oxford ties are the style of shoe responsible for this lesion. Blisters are also found on the dorsum of the great toe over the tendon of the extensor longus hallucis. They are also occasionally found on the plantar surface, the ends of the toes, and between the toes.
176. *What is the treatment of blisters?* Treatment depends greatly upon the condition of the lesion when the patient presents himself for treatment. If the skin is intact, the blister should be

drained at the edges, and the superimposed skin allowed to remain in place. The part is washed with alcohol, 60 per cent., and protected with a cocoon dressing or a gauze dressing, under which has been placed a soothing ointment, such as ichthyol, 10 per cent., or compound parathesin ointment. If the skin is broken there is grave danger of infection, and the wound must be treated accordingly. All precautions must be taken and a wet dressing of bichloride of mercury (1-5000) is used for one or two days. If there is no suppuration, the part may be dressed with a suitable shield or gauze pad and stimulants such as ichthyol, 25 per cent., or balsam of Peru ointment, 5 per cent, should be applied. No shoe should be worn during the process of repair.

177. *Define a burn.* A burn is an inflammatory lesion caused by heat or by caustics. They are classified according to their severity as first, second, and third degree burns. They may involve only the superficial layers of the skin or they may penetrate the deeper layers and may cause permanent injury or death.
178. *What are burns of the first degree?* Burns of the first degree are those which involve the outer layers of the epidermis and manifest themselves by a tingling sensation, without loss of tissue. A mild sunburn is an example.
179. *What are burns of the second degree?* Burns of the second degree are those which involve the layers of the epidermis including the rete. They are painful and cause the formation of blisters.
180. *What are burns of the third degree?* Burns of the third degree are those which involve the deeper structures and cause sloughing, severe shock, and even death.
181. *What is the treatment of burns of the second degree?* The lesion is primarily aseptic and this should be maintained during treatment. Exclusion of air will help relieve pain and ointments are best suited for this. Carron oil (linseed oil and lime water, equal parts), is a valuable emergency dressing. Compound parathesin ointment will also keep the part aseptic and relieve pain. The patient must rest as much as possible until healing is well advanced.
182. *What is the treatment of third degree burns?* Treatment of this condition belongs to the practitioner of medicine, especially where large areas are involved and shock is present. The paraffin treatment is being used with success in addition to rest and immobilization. An important part in the treatment of severe burns is the prevention of deformities. The scar tissue that forms in burns causes contraction and this in turn often produces serious deformity.
183. *Define bursitis.* Bursitis is an inflammation of the bursa sac. The bursae are closed sacs or pouches which are found in joints or where tendons move over bones. There are two kinds of bursae, the bursae mucosae, which secrete a mucous substance and the

bursae synovia, which secrete a thin fluid called synovia. The latter type are found mostly in the foot.

184. *Where does bursitis usually occur in the foot?* The most common location is the great toe joint. The fifth toe joint is another common site as well as the under and posterior surface of the heel and the tarso-metatarsal region on the dorsum of the foot.
185. *How is bursitis classified?* Bursitis is classified as acute, subacute, and chronic.
186. *Define acute bursitis.* Acute bursitis is a condition in which the symptoms of inflammation are very active, the course short, and the synovial fluid has found an outlet and is being discharged on the surface.
187. *Define subacute bursitis.* Subacute bursitis is a condition in which the inflammatory symptoms have not reached the stage of severity of acute bursitis, but which is more active than the chronic stage.
188. *Define chronic bursitis.* Chronic bursitis is a condition in which the inflammation is of long standing and not active. The walls of the bursa sac have become thickened and there is no great amount of overproduction of synovia. This is the usual type seen on the great toe joint and is called "bunion" by the layman.
189. *What is the etiology of bursitis?* The cause of bursitis on the foot is nearly always traumatic. A sudden blow, the foot being stepped on, or the pressure of a shoe, all may be exciting causes. Hallux valgus is a secondary cause in bursitis of the great toe joint. In calcaneal bursitis, focal infection is responsible for the lesion occasionally.
190. *What is the pathology of bursitis?* The pathology of bursitis is that of inflammation. The trauma causes an increased blood supply, serous infiltration occurs and the sac increases its function. The sac then becomes distended and when pressure from within is sufficient, the fluid seeks an outlet. Following the line of least resistance, a small sinus forms leading to the surface and thus the excess fluid is thrown off.
191. *What are the symptoms of bursitis?* The objective symptoms are swelling, redness, and heat. There is loss of function and fluctuation is present. The patient complains of pain on slightest pressure and a feeling of fullness in the part. The area is swollen and the sac is so distended that it can be taken in the fingers and fluctuates. A callous often covers the top of the lesion and when this is removed the sinus is seen from which will exude a thin, viscid, clear fluid, the synovia. This fluid is readily differentiated from pus, the application of hydrogen peroxide proving it easily. Pus will cause ebullition with this antiseptic while synovia will cause little if any.
192. *What is the treatment of bursitis?* Treatment for bursitis is di-

vided into three classes: (a) radical operative, (b) non-radical operative, (c) palliative.

193. *Describe the radical operative treatment of bursitis.* With proper asepsis and under local anesthesia, an incision is made through the skin above the lesion and the entire bursa is then dissected out. The wound is closed with a few interrupted sutures and the patient kept in bed with the foot elevated for a few days. If the bursa be infected, the incision must be made through the infected area, and drainage affected in the proper manner by means of wet dressings, etc.
194. *Describe the non-radical operative treatment of bursitis.* If a callusity or an heloma are present, they must be removed in the usual manner. This will often be sufficient to afford relief to the patient. Drainage of the bursal fluid will usually occur when this is done, but if not, the sac can be drained by means of an aspirating needle inserted into it.
195. *Describe the palliative treatment of bursitis.* This procedure is usually combined with the non-radical operative treatment. All measures that will help to give relief from pain should be utilized. Rest is an important factor especially in acute bursitis. Two or three days of complete rest will often do more than all other available measures. Shielding plays an important part in treatment as it relieves pressure from the affected area and shields must be applied with great care as the surrounding tissues are often swollen and allowance must be made for this. Water is a valuable remedial agent and can be used as either hot or cold compresses. Drugs find considerable use in the treatment of bursitis. They are usually applied in ointment form in the aperture of the shield. Stimulating drugs are used in chronic bursitis and soothing agents are best for acute bursitis. Astringent wet dressings are valuable in acute bursitis, Burow's solution being the most popular agent used in chiropody practice. Lead and opium wash is valuable in those lesions which are extremely painful. In chronic cases, baking, massage, and electricity (diathermy and violet ray) are of value.
196. *Define chimatlon.* Chimatlon, or pernio, is an inflammation of the skin and deeper structures due to exposure to varying degrees of cold and dampness. It is divided into two classes: (a) chimatlon mild and (b) chimatlon severe.
197. *Define chimatlon mild.* Chimatlon mild, or chilblains, is an inflammation of the skin due to exposure to cold and dampness.
198. *Define chimatlon severe.* Chimatlon severe, or frostbite, is an inflammation of the skin and deeper tissues due to exposure to severe cold for a prolonged period of time.
199. *What is the etiology of chimatlon mild?* Chimatlon mild is due primarily to exposure to a mild degree of cold. This affects the vaso-motor nerves and the circulation of the blood to the skin



is enhanced. The parts of the body most usually affected are the hands and feet. The distance of the extremities from the heart is probably the reason for this lack of nutrition under abnormal conditions. Further the skin of the feet is thicker than elsewhere and is imperfectly nourished, especially in cold weather when there is a natural slowing of the cutaneous blood stream in the attempt to conserve body heat. Females are more disposed to chilblains than males and young people more than old.

200. *What are the symptoms of chimatlon mild?* The symptoms vary with the severity of the condition. The pain may be only a slight tingling or itch with a light scarlet color to the skin and the part feels cold and clammy to the touch. The usual type of case presents a dark blue or purple skin with severe itching and sharp shooting pains, especially at night when the patient has retired. Blebs may form which will discharge serum or even pus.
201. *What is the pathology of chimatlon mild?* Immediately after exposure to cold, the small blood vessels are constricted and the blood stream is retarded within. Prolongation of the exposure causes a paralysis of the vaso-motor nerve terminals and the control over the blood vessels is lost and the muscular coat of the vessels becomes atrophied. Thus, the vessels remain in a state of inactivity and the movement of the blood within them is slow and sluggish. Destruction of tissue beyond this point will terminate in necrosis or gangrene and constitutes the pathology of chimatlon severe.
202. *What is the prognosis of chimatlon mild?* The prognosis is uncertain. Mild cases often respond readily while others persist. The painful symptoms can be relieved, but the condition usually continues until the change of season.
203. *What is the treatment of chimatlon mild?* If the patient is seen immediately after exposure, a gradual reaction should be brought about by the use of cold water or snow massaged over the affected part. After reaction has been established, treatment varies with the severity of the lesions. If the skin is unbroken, stimulants and anodynes should be used. If the skin is broken it should be healed with suitable agents, the best of which is ichthyol. The alternate foot bath should be used in all cases, and the patient instructed to wear such clothes that will tend to conserve body heat. Woolen underwear and stockings should be prescribed and broad-toe, low-heel, vici-kid shoes should be worn. Itching can be relieved by the use of camphor or phenol. If inflammation is so severe that the parts are greatly swollen and walking is painful, wet dressings of Burow's solution should be applied for two or three days. Coal oil, or kerosene oil, is very efficient for chilblains, especially when the skin is not broken. It must be applied with care to prevent blistering of the skin.
204. *What is the etiology of chimatlon severe?* Chimatlon severe is caused only by prolonged exposure to extreme degrees of cold. The lowered temperature causes complete paralysis of the vaso-



motor nerves and the parts are deprived of all nourishment. They subsequently are devitalized.

205. *What are the symptoms of chimatlon severe?* If seen immediately after exposure, the parts appear white, the patient complains of numbness and all sensation is lost. When the tissues thaw, they may be completely devitalized and gangrene will manifest itself immediately. If freezing is not complete, there will be a severe inflammatory reaction, and the parts will become purple, swollen, and extremely painful. Soon a line of demarcation will appear between the living and the dead tissues which latter finally slough off.
206. *What is the pathology of chimatlon severe?* The pathologic changes in chimatlon severe are much the same as in chimatlon mild during the initial stages. The exposure to extreme cold causes complete loss of blood supply over a limited area, which terminates in death of those tissues. Gangrene may be immediate or it may appear some time after reaction has commenced.
207. *What is the prognosis of chimatlon severe?* If freezing has been complete, nothing can be done to save the tissues. If treatment is commenced immediately after exposure, much can be done and often large areas of tissue can be saved that otherwise would become gangrenous. The ulcers that result after the dead tissue has been removed require a long period of time to heal, and the patient complains of pains in the region of the lesion even for years after exposure.
208. *What is the treatment of chimatlon severe?* The first step in treatment, even if the parts seem hopelessly frozen, is to bring about a gradual reaction with snow and cold water. Cases in which the entire fore-foot has been involved, were treated in this way, the primary treatment extending over several hours, with the result that only a small portion of two of the toes were lost. After a line of demarcation has developed, the gangrenous tissue should be removed. The resultant ulcer must receive careful attention with dressings changed at regular, frequent intervals. Ointments containing stimulants such as balsam of Peru, ichthyol, or scarlet red, with a mild antiseptic such as white precipitate, 2 per cent., is the most practical therapeutic procedure. Massage, electro-therapy, and hydro-therapy are also valuable adjuncts.
209. *Define hyperidrosis.* Hyperidrosis, or excessive sweating, is a functional disorder of the sweat glands characterized by excessive sweat excretion. The condition may be general or it may be localized. The hands and feet are most usually affected.
210. *What is the etiology of hyperidrosis?* Generalized hyperidrosis is due to faulty innervation. Local hyperidrosis is caused by various factors. Excessive drinking of tea or water will cause it in some persons, and debilitating diseases will often cause local sweating which persists for some time after the disease is cured. Neuras-thenics often suffer from hyperidrosis of the feet. Physical or

mental excitement is a cause in many persons.

211. *What is the pathology of hyperidrosis?* The association of the nervous system with sweat excretion is close, and there is a nervous cause in pathologic sweating. Probably there is an injury or disease that affects the sympathetic nervous system which, in turn, causes excessive sweating. Microscopic examination of the glands fails to show any change in the structure of these organs.
212. *What are the symptoms of hyperidrosis?* The feet are damp and clammy. Sweating is most profuse on the soles and between the toes. The skin is soggy and macerated and in severe cases the parts will become puffy and irritated and the surrounding area will be red. In ordinary hyperidrosis there is no offensive odor, but the condition is often associated with bromidrosis.
213. *What is the prognosis of hyperidrosis?* Localized cases are obstinate, but persistent treatment will bring good results. Recurrence is the rule, especially when the etiology is nervous in origin.
214. *What is the treatment of hyperidrosis?* General treatment consists of general tonics and attempts to correct the systemic cause. Local treatment consists of the use of alternate foot baths and the application of astringents such as alum, tannic acid, or zinc sulphate. Dusting powders containing salicylic acid, 2 per cent., with alum and lycopodium or talc are beneficial. If the skin is badly macerated, ointments containing astringents are advised. Hygiene of the foot must be carefully observed, and shoes and stockings should be changed twice daily.
215. *What is bromidrosis?* Bromidrosis is a functional disorder of the sweat glands characterized by a sweat excretion of a foul odor.
216. *What is the etiology of bromidrosis?* The etiology of bromidrosis is varied. Nervous and anemic persons are often affected, especially when hyperidrosis is present. Certain foods such as garlic, onions, etc., often give peculiar odors to the perspiration. The characteristic odor of bromidrosis of the foot is caused by the decomposition of the fatty acids contained in the perspiration, in the presence of the bacterium fetidum, which is found on the foot, especially between the toes.
217. *What are the symptoms of bromidrosis?* The sweat has a disagreeable odor and is usually associated with hyperidrosis, but not necessarily so. The odor is offensive, stale, penetrating, and peculiar, and in many instances makes the sufferer unfit for society.
218. *What is the treatment of bromidrosis?* If the condition is associated with hyperidrosis, astringents must be used, but the offensive odor can only be eliminated by the use of deodorants and antiseptics. Absolute cleanliness is essential and the feet should be washed often. Footgear should be changed twice daily. Boric acid may be added to the water in which the feet are washed. Potassium permanganate, 1 per cent., applied as a lotion or a 5 per cent. solution of chromic acid are valuable remedies. Formalin

is a powerful antiseptic and deodorant, but must be used with caution as its action is strong. It is usually applied in a 5 per cent. alcoholic solution as a lotion.

219. *Define anidrosis.* Anidrosis is a functional disorder of the sweat glands characterized by a suppression of sweat.
220. *What is the etiology of anidrosis?* Anidrosis is usually caused by some systemic disease such as diabetes and in some skin diseases like ichthyosis. Injury to the nerves is also an etiologic factor in localized suppression of sweat.
221. *What are the symptoms of anidrosis?* The skin is very dry and on the sole of the foot clefts and fissures are often seen. Helomata miliaria accompany anidrosis in many instances. In marked cases, urinalysis should be done as diabetes is very often responsible for the skin condition.
222. *What is the treatment of anidrosis?* Application of hot water or vapor baths externally, the wearing of warm clothing, and general tonics is of help. Massage with oil and the uses of galvanic and Faradic electricity are also valuable adjuncts.
223. *Define ulcer.* An ulcer is a lesion of the skin or mucous membrane which is attended with more or less suppuration and which shows no tendency to heal. A wound caused by trauma is not primarily an ulcer, but it may become so.
224. *Mention the ulcers seen on the foot.* The types of ulcers found on the foot are simple ulcer, indolent or callous ulcer, varicose ulcer, perforating ulcer, and syphilitic ulcer.
225. *What are the causes of ulcers?* There are both predisposing and exciting causes for ulcers. Constitutional diseases such as anemia, gout, diabetes, tuberculosis, etc., which lower the resistance of the body are predisposing causes. Traumatism and bacterial infection are the most frequent exciting causes.
226. *Describe simple ulcer of the foot.* This type is the most frequently found ulcer and is usually associated with neglected callusities and helomata, especially on the sole of the foot, under the heads of the first and fifth metatarsals.
227. *What is the treatment of simple ulcer?* All overlying callous must be removed; if part is draining freely, wet dressings are to be applied. If drainage is mild, ointment dressings of stimulants such as scarlet red, balsam of Peru, or ichthyol are best. Shielding is important, especially in ulcers on the sole.
228. *Describe indolent or callous ulcer.* This type is found on the leg and foot and is a chronic lesion, with hard elevated edges, few granulations, and is slow to heal. The size varies greatly and it is dirty yellow in color with the base firmly attached to the surrounding tissues.
229. *What is the treatment of indolent or callous ulcer?* Treatment varies with the stage of the lesion. Wet dressings should be used

in freely draining cases. Cleansing of the surface of the ulcer is important and is done with tincture green soap and water. Granulation is stimulated by the use of such agents as silver nitrate solution, balsam of Peru, 50 per cent. in castor oil, etc.

230. *Describe varicose ulcer.* Varicose ulcer is associated with varicose veins. It is usually seen in the lower third of the leg and is characterized by the pigment which surrounds the lesion. The edges are everted and swollen, the swelling being edematous. The discharge is thin and often bloody. Granulations are weak and flabby.
231. *What is the treatment of varicose ulcer?* The veins surrounding the ulcer must be supported by proper bandaging. Operation on the veins is often done. The standard stimulants are used in connection with bandaging for compression.
232. *Describe perforating ulcer of the foot.* The ulcer is usually found where pressure is great and, therefore, the sole of the foot is the usual location. It occurs more in males than in females and usually between the ages of 40 and 60. The lesion is circular and the edges are calloused. There is no sensation in the part, even when the lesion is deeply probed.
233. *What is the treatment of perforating ulcer?* Systemic causes, if present, must be cared for. Necrotic tissue must be thoroughly removed and all burrowing sinuses must be opened wide. Powerful antiseptics should not be used as they irritate. Stimulants are used, but treatment is of little avail as recurrence is the rule even after the lesion has been apparently completely healed.
234. *Describe the syphilitic ulcer.* This ulcer is associated with syphilis and is the result of breaking down of a tertiary lesion called a gumma. The upper third of the leg is the most frequent site. The appearance is characteristic. The edges are sharp and appear as if they were punched out. The slough is greenish and the floor of the ulcer is copper color.
235. *What is the treatment of syphilitic ulcer?* General treatment directed against the disease will often be sufficient to heal the local lesion. The ulcer is dressed with mercurial ointments, of which white precipitate is most popular. Without general treatment, local applications are useless.













WE 890 N277c 1923

36910680R



NLM 05181361 6

NATIONAL LIBRARY OF MEDICINE